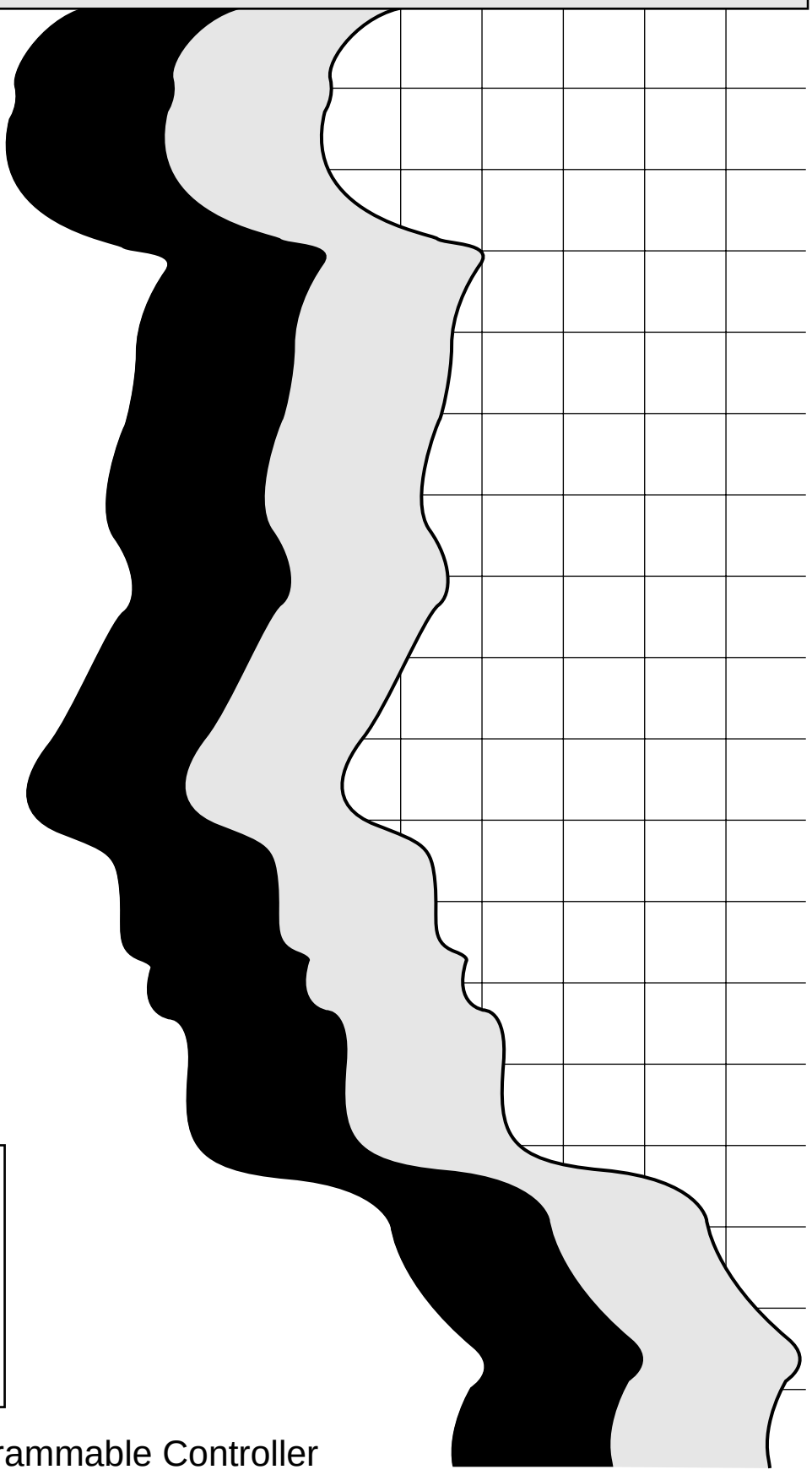
MITSUBISHI

Digital-Analog Converter Module Type AJ65BT-64DAV/DAI

User's Manual



A

MELSEC

Mitsubishi Programmable Controller

• SAFETY PRECAUTIONS •

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly.
The precautions given in this manual are concerned with this product. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.
These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: “DANGER” and “CAUTION”.

⚠ DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.
⚠ CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

- Configure a safety circuit so that the safety of the overall system is maintained even when an external power error or PLC error occurs.
  Accident may occur due to output error or malfunctioning.
  (1) The status of analog output changes depending on the setting of various functions that control the analog output. Take sufficient caution when setting for those functions.
  For details of analog output status, refer to Section 3.4.5 “Combinations of functions in each part”
  (2) Normal output may not be obtained due to malfunctions of output elements or the internal circuits. Configure a circuit to monitor signals which may lead to a serious accident

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100mm(3.9inch) or more from each other.
  Not doing so could result in noise that would cause erroneous operation.
- At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module.
  In such case, wait until the analog output becomes stable to start controlling the external device.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the module in the environment given in the general specifications of this Manual.
  Using the module outside the range of the general specifications may result in electric shock, fire or malfunctioning, or may damage or degrade the module.
- Securely fix the module with seated P-shape pan screws to the installation holes (two locations).
  Improper installation may result in breakdowns or cause the module to fall out.
- Do not touch the conducted area of the module.
  Doing so may cause module malfunctioning or breakdowns.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Be sure to shut off all phases of the external power supply used by the system before installation or wiring.
  Not doing so can cause the product to be damaged or malfunction.
- Always ground the FG terminal to the protective ground conductor.
  Failure to ground these terminals may cause malfunctioning.
- Use applicable solderless terminals and tighten them with the specified torque. If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- When wiring the module, check the rated voltage and terminal layout of the wiring, and make sure the wiring is done correctly. Connecting a power supply that differs from the rated voltage or wiring it incorrectly may cause fire or breakdown.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it may result in short circuits, fire or malfunctioning.
- Be careful not to let foreign matter such as filings or wire chips get inside the module. These can cause fire, breakdowns and malfunctioning.
- When connecting the communication and power supply cables to the module, always run them in conduits or clamp them.
  Not doing so can damage the module and cables due to loose, moved or accidentally pulled cables or can cause a malfunction due to a cable connection fault.
- Do not install the control lines together with the communication cables, or bring them close to each other. Failure to do so may cause malfunctions due to noise.
- When disconnecting the communication and power supply cables from the module, do not hold and pull the cable part.
  Disconnect the cables after loosening the screws in the portions connected to the module.
  Pulling the cables connected to the module can damage the module and cables or can cause a malfunction due to a cable connection fault.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not touch the terminals while the power is on. Doing so may cause malfunctioning.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws.
  Not doing so can cause the module to fail or malfunction.
  Undertightening can cause a drop, short circuit or malfunction.
  Overtightening can cause a drop, short circuit or malfunction due to damage of the screws or module.
- Never disassemble or modify the module.
  This may cause breakdowns, malfunctioning, injury and/or fire.
- Do not drop the module or give it hard impact since its case is made of resin. Doing so can damage the module.
- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel.
  Not doing so can cause the module to fail or malfunction.
- Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant)
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
  Failure to do so may cause a failure or malfunctions of the module.

[DISPOSABLE PRECAUTIONS]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

REVISIONS

* The manual number is given on the bottom left of the back cover.

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Introduction

Thank you for purchasing the Mitsubishi Graphic Operation Terminal.
Before using the equipment, plese read this manual carefully to develop full familiarity with the functions and performance of the graphic operation terminal you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

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About this Manual

The following are manuals related to this product.
Request for the manuals as needed according to the chart below.

Related Manuals

Manual Name	Manual No. (Type code)
CC-Link System Master/Local Module User's Manual type AJ61BT11/A1SJ61BT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61BT11 and A1SJ61BT11. (Optionally available)	IB-66721 (13J872)
CC-Link System Master/Local Module User's Manual type AJ61QBT11/A1SJ61QBT11 Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61QBT11 and A1SJ61QBT11. (Optionally available)	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual type QJ61BT11N Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the QJ61BT11N. (Optionally available)	SH-080394E (13JR64)

Conformation to the EMC Directive and Low Voltage Instruction

When complying with EMC Directives and Low-Voltage Directives by assembling a Mitsubishi PLC compatible with EMC Directive and Low-Voltage Directives into the user product, refer to Chapter 3 "EMC Directives and Low-Voltage Directives" in the User's Manual (Hardware) for the CPU module being used.
The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.
To conform this product to the EMC Directive and Low Voltage Directive, refer to the Section of "CC-Link Modules" in Chapter 3 "EMC Directive and Low Voltage Directive" of the User's Manual (Hardware) of the CPU module used.

1. OVERVIEW

This user's manual describes the specification and handling of AJ65BT-64DAV digital analog voltage conversion module (abbreviated as AJ65BT-64DAV from here on) and AJ65BT-64DAI digital analog current conversion module (abbreviated as AJ65BT-64DAI from here on), which is used as the remote device station for the CC-Link system.

(1) AJ65BT-64DAV
This is a module which converts the digital values (16-bit encoded binary value) set in the PLC CPU to analog values (-10V to 0V to 10V voltage), and performs an external output to four channels.

(2) AJ65BT-64DAI
This is a module which converts the digital values (16-bit encoded binary value) set in the PLC CPU to analog values (4mA to 20mA current), and performs an external output to four channels.

In this manual, the name which refers to both AJ65BT-64DAV and AJ65BT-64DAI is abbreviated as “AJ65BT-64DAV/DAI.”

1.1 Features

The AJ65BT-64DAV/DAI has the following features:

(1) One module can provide four channels of D/A conversion.
The AJ65BT-64DAV/DAI can produce output of analog values (voltage/current) to four external devices.

(2) The analog-output enable/prohibit setting is possible for each channel.
The sequence program can specify whether to enable or prohibit analog output to the external devices after the D/A conversion for each channel.
Analog output from the channel where the analog output is prohibited will be 0V or 0mA.

(3) You can make the analog output hold/clear setting at a PLC CPU stop or link error occurrence (all channels batch).
Using the HOLD/CLR terminal, you can select whether to hold or clear the analog output at the instant the PLC CPU is set to a STOP status or a link error occurs.

(4) Offset and gain setting
When a fine I/O conversion characteristic is required, the offset and gain setting of each channel can be set without a volume control, enabling to modify the I/O conversion characteristic as desired.

MEMO

2. SYSTEM CONFIGURATION

(1) Applicable CPU

(a) When the master module is AJ61BT11:

- A0J2CPU
- A0J2HCPU
- A1CPU
- A2CPU(S1)
- A3CPU
- A1NCPU
- A2NCPU(S1)
- A3NCPU
- A3MCPU
- A3HCPU
- A2ACPU(S1)
- A3ACPU
- A2UCPU(S1)
- A3UCPU
- A4UCPU
- A73CPU
- A1SCPU(C24-R2)
- A1SJCPU
- A2SCPU
- A2USCPU(S1)
- Q02CPU-A
- Q02HCPU-A
- Q06HCPU-A
- A1SJHCPU
- A1SHCPU
- A2SHCPU

(b) When the master module is AJ61QBT11:

- Q2ACPU(S1)
- Q3ACPU
- Q4ACPU
- Q2ASCPU(S1)
- Q2ASHCPU(S1)

(c) When the master module is A1SJ61BT11:

- A1SCPU(C24-R2)
- A1SJCPU
- A2SCPU
- A2USCPU(S1)
- Q02CPU-A
- Q02HCPU-A
- Q06HCPU-A
- A1SJHCPU
- A1SHCPU
- A2SHCPU

(d) When the master module is A1SJ61QBT11:

- Q2ASCPU(S1)
- Q2ASHCPU(S1)

(e) When the master module is QJ61QBT11/QJ61BT11N:

- Q00JCPU
- Q00CPU
- Q01CPU
- Q02CPU
- Q02HCPU
- Q06HCPU
- Q12HCPU
- Q25HCPU
- Q12PHCPU
- Q25PHCPU
- Q12PRHCPU
- Q25PRHCPU

MEMO

3. SPECIFICATIONS

The general specifications, performance specifications, and I/O characteristics of the AJ65BT-64DAV/DAI are explained.

3.1 General Specification

The general specifications of the AJ65BT-64DAV/DAI are shown in Table 3.1.

Table 3.1 General specification

Item	Specification				
Usage ambient temperature	0 to 55°C				
Storage ambient temperature	-20 to 75°C				
Usage ambient humidity	10 to 90%RH, no condensation				
Storage ambient humidity	10 to 90%RH, no condensation				
Vibration durability	Compliancy standard	JIS B 3502, IEC61131-2			
		Frequency	Acceleration	Amplitude	Sweep count
	When there is intermittent vibration	10 to 57Hz	—	0.075mm (0.0030inch)	10 times in each direction X, Y, Z (80 minutes)
		57 to 150Hz	9.8m/s^2	—	
	When there is continuous vibration	10 to 57Hz	—	0.035mm (0.0014inch)	—
		57 to 150Hz	4.9m/s^2	—	
Shock durability	Conforming to JIS B 3502, IEC61131-2 (147m/s^2, 3 times each in XYZ directions)				
Usage environment	No corrosive gas				
Usage height *3	Less than 2000 m (Less than 6562 ft.)				
Installation area	Within the control board				
Over-voltage category *1	Less than II				
Pollution rate *2	Less than 2				

Remark

*1 Indicates the location where the device is connected from the public cable network to the device structure wiring area.
Category II applies to the devices to which the power is supplied from a fixed equipment.
Surge withstand voltage for devices with up to 300V of rated voltage is 2500V.

*2 This is an index which indicates the degree of conductive object generation in the environment where the device is used. Level 2 is an environment where only nonconductive objects are formed with some chances of temporary conductivity generation due to occasional condensation.

*3 Do not operate or store the PLC in the environment where the pressure applied is equal to greater than the atmospheric pressure at the altitude of 0m.
Doing so may cause a malfunction. Please consult our branch office when the PLC is to be operated under pressure.

3.2 Performance Specification

The performance specification of the AJ65BT-64DAV/DAI is shown Table 3.2:

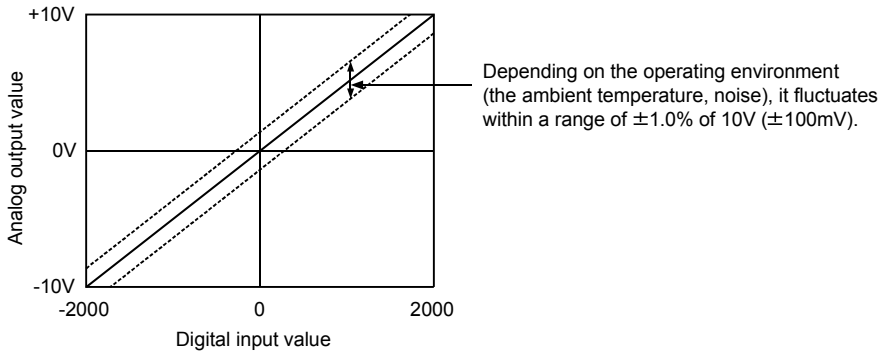
Table 3.2 Performance specification

Item	Specification			
	AJ65BT-64DAV		AJ65BT-64DAI	
Digital input value	16-bit encoded binary (valid bit: 12 bits)			
	-2048 to 2047		0 to 4095	
Analog conversion value	Voltage: -10 to 10VDC (External load resistance: 2kΩ to 1MΩ)		Current: 4 to 20mADC (External load resistance: 0 to 600Ω)	
I/O characteristics	Digital input value	Analog conversion value	Digital input value	Analog conversion value
	+2000	+10V	4000	+20mA
	+1000	+5V	2000	+12mA
	0	±0V	0	+4mA
	-1000	-5V		
	-2000	-10V		
Offset/gain adjustment	Yes (user setting or factory setting)			
Maximum resolution *1	5mV		4μA	
Total accuracy *2 (accuracy for the maximum value)	± 1% (± 100mV)		± 1% (±200μA)	
Maximum conversion speed *3	Max. 1ms per channel (4ms per 4 channels)			
Output short-circuit protection	Yes			
Insulation system	Across output channels: Non-insulated Across external supply power and analog output: Transformer insulated			
Analog output points	4 channels per module			
I/O occupied points	2 stations: 32 points each for RX/RY 8 points each for RWr/RWw			
Connector terminal block	27-point terminal block (M3.5 × 7 screws)			
Supported cable size	0.75 to 2.00mm^2			
Supported solderless terminal	RAV 1.25-3.5 (according to JIS C 2805), RAV 2-3.5			
Module installation screw	M4 x 0.7mm x 16mm or larger screw (tightening torque 78 to 118N·cm) Installable with the DIN rail.			
Supported DIN rail	TH35-7.5Fe, TH35-7.5Al,TH35-15Fe (conforming to JIS C 2812)			
External supply power	24V DC (20.4V DC to 26.4V DC)			
	Inrush current: 1.5A, within 0.67ms		Inrush current: 3.2A, within 0.43ms	
	Current consumption:0.18A		Current consumption:0.27A	
Noise resistance	Noise voltage: 500Vp-p Measured using a noise simulator with 1μs of noise amplitude and 25 to 60Hz of noise frequency.			
Dielectric withstand voltage	Power and communication systems batch-Analog output batch, 500VAC, one minute			
Insulation resistor	Power and communication systems batch-Analog output batch, 500VDC 10MΩ or more at the insulation resistance tester			
Weight	0.4kg		0.4kg	

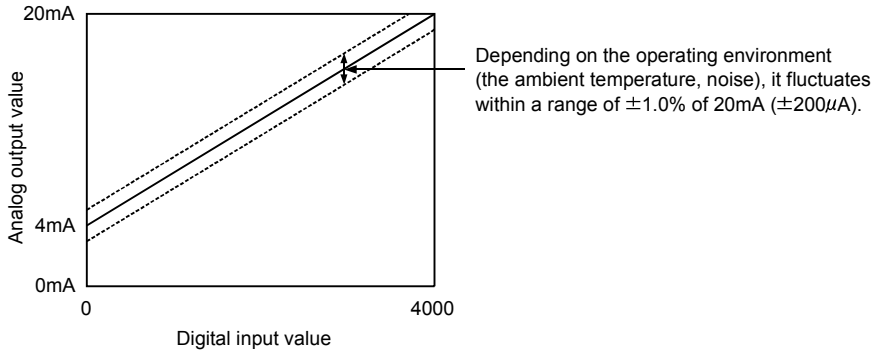
*1 Maximum resolution of analog value
The maximum resolution of analog value means the variation of analog value when the digital value changes for "1".

*2 Total accuracy
The total accuracy is the accuracy of the maximum analog output value.

① The overall accuracy of the AJ65BT-64 DAV is the accuracy for 10V.



② The overall accuracy of the AJ65BT-64 DAI is the accuracy for 20mA.



*3 Maximum conversion speed
The maximum conversion speed means the time required to read the digital value written in the buffer memory, execute the D/A conversion, and output the specified analog value. It takes the longest (1ms) to produce the maximum analog output value when the current output is the minimum, and to produce the minimum analog output value when the current output is the maximum.

3.3 I/O Conversion Characteristics

The I/O conversion characteristics of the AJ65BT-64DAV/DAI are explained.

3.3.1 Offset value and gain value

(1) Offset value
This is an analog value (voltage or current value) produced by the AJ65BT-64DAV/DAI when the digital value set by the PLC CPU is "0".

(2) Gain value
This is an analog value (voltage or current value) produced by the AJ65BT-64DAV/DAI when the digital value set by the PLC CPU is "2000" for AJ65BT-64DAV, and "4000" for AJ65BT-64DAI.

(3) The factory-set offset and gain values are as follows:

	AJ65BT-64DAV	AJ65BT-64DAI
Offset value	0V	4mA
Gain value	10V	20mA

(4) The offset value and gain value can be set separately for each channel in the test mode.

3.3.2 I/O conversion characteristics

(1) When AJ65BT-64DAV is used:

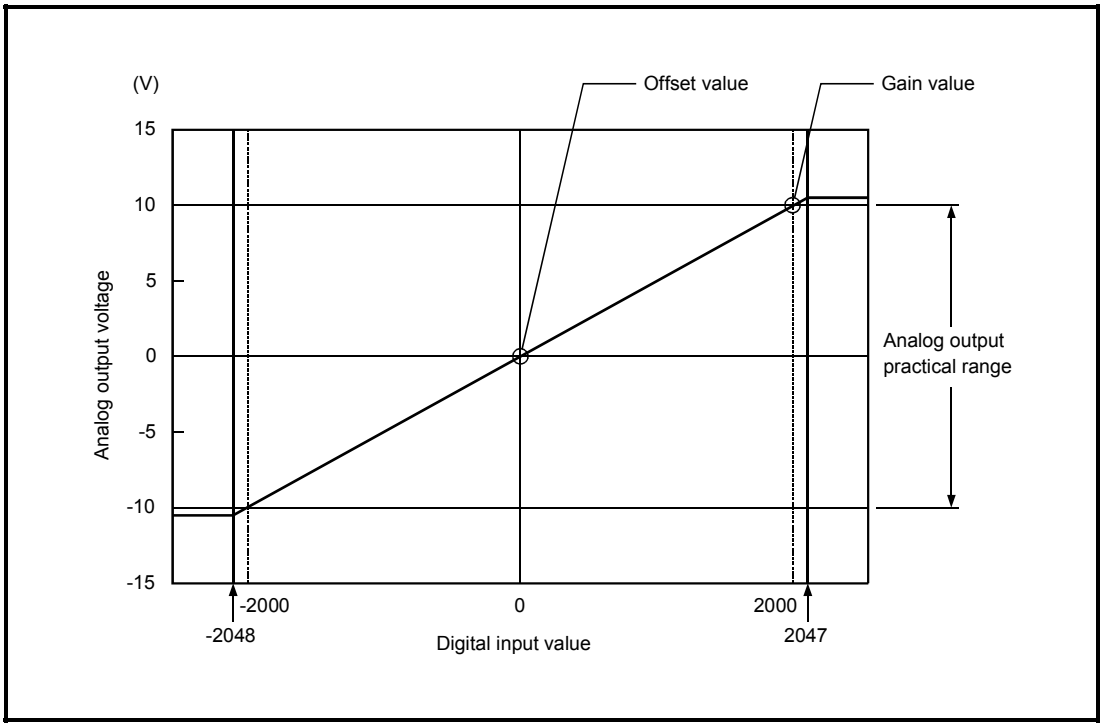


Figure 3.1 I/O conversion characteristics of the AJ65BT-64DAV

① How to calculate the analog output value:
The resolution of AJ65BT-64DAV can be set arbitrarily by modifying the settings of the offset value and gain value.
How to calculate the analog value resolution and the analog output value for a given digital input value when the settings of the offset value and gain value are changed is shown next.

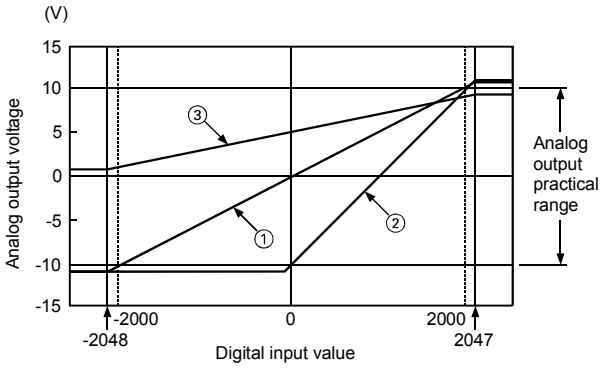
(Analog output) = (Analog resolution) × (Digital input value) + (Offset value)

$$(\text{Analog resolution}) = \frac{(\text{Gain value}) - (\text{Offset value})}{2000}$$

② The following graph shows the I/O characteristics when the offset and gain values of the AJ65BT-64DAV are changed:

The I/O conversion characteristics are shown in the graph on the right when the offset value and the gain value are set as in the following table:

Number	Offset value	Gain value
①	0V	+10V
②	-10V	+10V
③	+4V	+8V



Example

The analog output voltage for the characteristic graphs ① to ③ becomes as below, when the digital input value is at 1000 and 500:

Number	Digital input value	Analog output voltage
①	1000	+5.0V
	500	+2.5V
②	1000	0V
	500	-5.0V
③	1000	+6.0V
	500	+5.0V

Figure 3.2 I/O conversion characteristics of AJ65BT-64DAV

(2) When AJ65BT-64DAI is used:

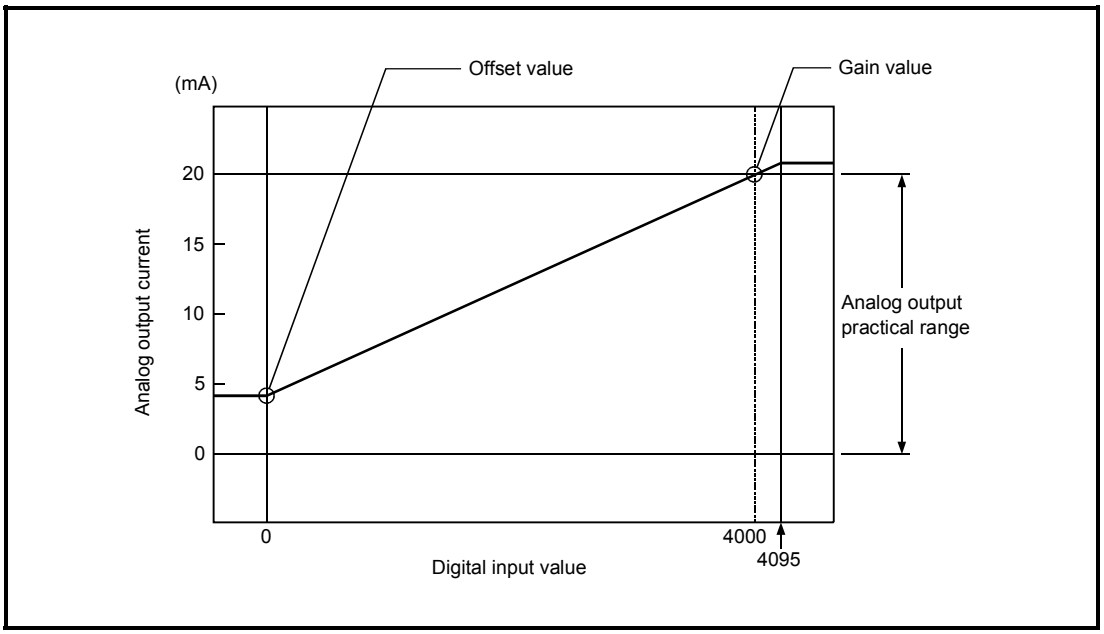


Figure 3.3 I/O conversion characteristics of AJ65BT-64DAI

① How to calculate the analog value

The resolution of AJ65BT-64DAI can be set arbitrarily by modifying the settings of the offset value and gain value.

How to calculate the analog value resolution and the analog output value for a given digital input value when the settings of the offset value and gain value are changed is shown.

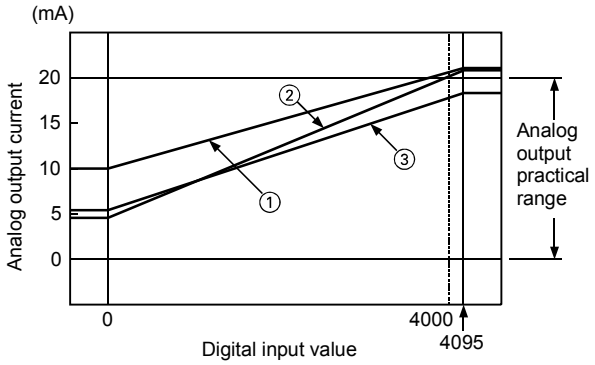
(Analog output) = (Analog resolution) × (Digital input value) + (Offset value)

$$\text{(Analog resolution)} = \frac{\text{(Gain value) - (Offset value)}}{4000}$$

② The following graph shows the I/O characteristic when the offset and gain values of the AJ65BT-64DAI are changed:

The I/O conversion characteristics are shown in the graph on the right when the offset value and the gain value are set as in the following table:

Number	Offset value	Gain value
①	10mA	20mA
②	4mA	20mA
③	6mA	16mA



Example

The analog output voltage for the characteristic graphs ① to ③ becomes as below, when the digital input value is at 2000 and 1000:

Number	Digital input value	Analog output voltage
①	2000	15mA
	1000	12.5mA
②	2000	12mA
	1000	8mA
③	2000	11mA
	1000	8.5mA

Figure 3.4 I/O conversion characteristics of AJ65BT-64DAI

3.4 Various Functions to Control the Analog Output

Various functions to control the analog output of the AJ65BT-64DAV/DAI are explained.

3.4.1 Function to specify hold or clear of the analog output when the PLC CPU is in the STOP status (HOLD/CLEAR setting)

Using this function, the HLD/CLR terminal on the module front panel can be used to set whether to retain or clear (i.e. to output the offset) the analog output value immediately before the PLC CPU enters the STOP status or before the AJ65BT-64DAV/DAI stops the D/A conversion due to an error. All channels are set simultaneously. (Including a time when link communications are shut off)

3.4.2 Function to specify executing or not executing the D/A conversion processing (Analog output enable signal)

Using this function, whether to output the D/A conversion value or the offset value can be selected for each channel by turning on or off the analog output enable signal from the PLC program.
However, the D/A conversion time (conversion speed) is constant regardless of the setting of the analog output enable signal.

ON: D/A conversion value OFF: Offset value

3.4.3 Function to specify enabling or prohibiting of the analog value external output (Analog output enable/prohibit setting)

Using this function, whether to enable or prohibit the external output of the analog signal can be specified for each channel by writing "0" or "1" to the remote register's address from the PLC program.

1: 0V/0mA 0: D/A conversion value or offset value

3.4.4 Offset/gain setting

When a fine I/O conversion characteristic is required, the I/O conversion characteristics can be modified arbitrarily by setting the offset and gain of each channel without a volume control, after entering the test mode by short-circuiting the test mode terminal. When it is not necessary, turning on the RYn4, which is the I/O signal to the master station, selects the factory-configured offset and gain values.

Factory-configured values:
AJ65BT-64DAV..... Offset value 0V, Gain value 10V
AJ65BT-64DAI ..... Offset value 4mA, Gain value 20mA

3.4.5 Combinations of various functions

By combining the functions explained above, the analog output when the PLC CPU is in the RUN status and when a module error occurs can be set as desired, as shown in Table 3.3.
Select each function depending on the analog output status of your choice.

Table 3.3 Analog output status combination list

Setting combination / Execution status	HOLD/CLEAR setting	CLEAR				HOLD	
	Analog output enable signal	Enable (on)		Prohibit (off)		Enable (on)/Prohibit (off)	
	Analog output enable/prohibit setting	Enable (0)	Prohibit (1)	Enable (0)	Prohibit (1)	Enable (0)	Prohibit (1)
Analog output status when the PLC CPU is in the RUN status		Output of the analog value after D/A conversion from the digital value specified by the PLC CPU	0V/0mA	Offset value	0V/0mA	Output of the analog value after D/A conversion from the digital value specified by the PLC CPU	0V/0mA
Analog output status when the PLC CPU is in the STOP status		Offset value	0V/0mA	Offset value	0V/0mA	Analog value before the PLC CPU stop is retained.	0V/0mA
Analog output status when the PLC CPU is in the error status		Offset value	0V/0mA	Offset value	0V/0mA	Analog value before the CPU error is retained.	0V/0mA
Analog output status when an error has occurred in the AJ65BT-64DAV/DAI		Output of the maximum or minimum analog value	0V/0mA	Offset value	0V/0mA	Output of the maximum or minimum analog value	0V/0mA
Analog output status when a WDT error (*) has occurred in the AJ65BT-64DAV/DAI		0V/0mA					
Analog output status when the L.RUN LED is turned off (when link communications are shut off)		Offset value	0V/0mA	Offset value	0V/0mA	Analog value before the LINK ERR is retained.	0V/0mA
Analog output status after reset		Output of the analog value after D/A conversion from the digital value specified by the PLC CPU	0V/0mA	Offset value	0V/0mA	Output of the analog value after D/A conversion from the digital value specified by the PLC CPU	0V/0mA

(*) WDT error ..... indicates the abnormal operation time by the PLC. The elapsed time for one scan by the program is monitored, and a WDT error results when it does not finish within the scheduled time.

3.5 I/O Signals to the Master Station

Assignment of the I/O signals and function of each signal are explained.

3.5.1 I/O signal list

The AJ65BT-64DAV/DAI uses 32 input points and 32 output points for exchanging signals with the master station.*1 The allocation of the I/O signals and the name of each signal are listed in Table 3.4. An RX device indicates an input signal from the AJ65BT-64DAV/DAI to the master module, and a RY device indicates an output signal from the master module to the AJ65BT-64DAV/DAI.

Table 3.4 I/O signals

Signal direction: AJ65BT-64DAV/DAI→Master		Signal direction: Master→AJ65BT-64DAV/DAI	
Device No.	Signal name	Device No.	Signal name
RXn0	Unusable	RYn0	CH.1 analog output permission signal
		RYn1	CH.2 analog output permission signal
to		RYn2	CH.3 analog output permission signal
		RYn3	CH.4 analog output permission signal
		RYn4	Offset/gain value selection
RXnF		RYn5 to RYnF	Unusable
RX (n+1) 0 to RX (n+1) 7	Unusable	RY (n+1) 0 to RY (n+1) 7	Unusable
RX (n+1) 8	Initial data processing request flag	RY (n+1) 8	Initial data processing complete flag
RX (n+1) 9	Initial data setting complete flag	RY (n+1) 9	Initial data setting request flag
RX (n+1) A	Error status flag	RY (n+1) A	Error reset request flag
RX (n+1) B	Remote READY	RY (n+1) B	Unusable
RX (n+1) C	Unusable	RY (n+1) C	Unusable
RX (n+1) D	Unusable	RY (n+1) D	Unusable
RX (n+1) E	(Unusable: QnA)	RY (n+1) E	(Unusable: QnA)
RX (n+1) F	(Unusable: QnA)	RY (n+1) F	(Unusable: QnA)

n: The address allocated to the master station in the station number setting

*1 Although the number of occupied stations for the AJ65BT-64DAV/DAI is 2, inputs, RX(n+2) 0 to RX(n+3)F, are not used.
However, devices for inputs, RX(n+2) 0 to RX(n+3)F, and outputs, RY(n+2) 0 to RY(n+3) F, are reserved in the master module or CPU module. When creating a program, pay attention to device allocation.

Point

If a device not allowed to use is turned on/off from the sequence program, the function of the AJ65BT-64DAV/DAI is not guaranteed.

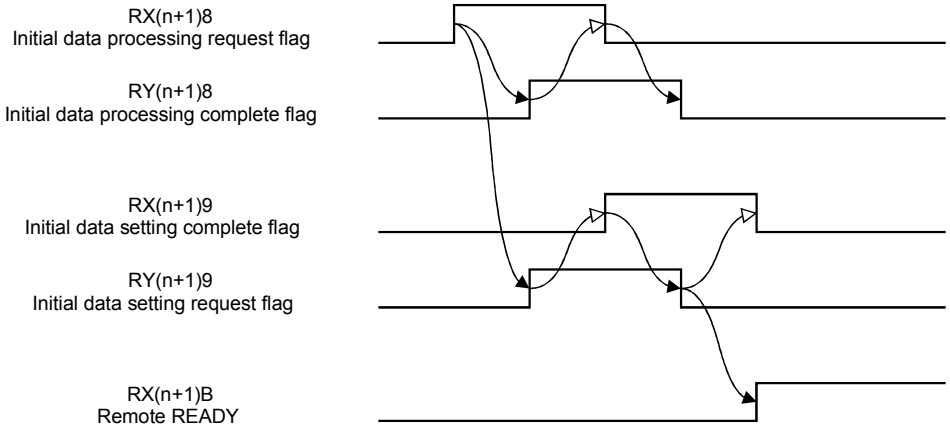
3.5.2 Functions of the I/O signals

Functions of the I/O signals of the AJ65BT-64DAV/DAI are shown in Table 3.5.

Table 3.5 Descriptions of the I/O signals

Device number	Signal Name	Description
RX (n+1) 8	Initial data processing request flag	After the power is turned on or after the hardware reset, the initial data processing request flag is turned on by the AJ65BT-64DAV/DAI in order to request the initial data setting. It is turned off when the initial data setting is complete (i.e. initial data processing complete flag RY(n+1)8 is turned on).
RX (n+1) 9	Initial data setting complete flag	When there is an initial data setting request (i.e. RY(n+1)9 is turned on), it is turned on by the initial data setting completion. When the initial data setting request flag is turned off after the initial data setting completion, the initial data setting complete flag is also turned off.
RX (n+1) A	Error status flag	This is turned on when an error other than the WDT error occurs on the AJ65BT-64DAV/DAI.
RX (n+1) B	Remote READY	This is turned on when the initial data setting is complete and the AJ65BT-64DAV/DAI is in the READY status, after the power is turned on or after the hardware reset. It is turned off during the test mode. (This is used to interlock the read and write from the master module.)
RYn0 to RYn3	CH. a analog output enable signal	These are the analog value output enable signals for channels 1 through 4. The analog output value from the corresponding channel is enabled when turned on. Turn it off to prohibit the output of the analog value.
RYn4	Offset/gain value selection	"User settings" or "factory settings" of the offset and gain values are selected by switching the RYn4. To select the factory setting, keep the RYn4 set to on.
RY (n+1) 8	Initial data processing complete flag	After the power is turned on or after the hardware reset, the initial data processing is executed by the initial data processing request, and this flag is turned on after the processing is completed.
RY (n+1) 9	Initial data processing request flag	Turn this on to set or modify the initial data.
RY (n+1) A	Error reset request flag	When the error reset request flag (RY(n+1)A) is turned on, the error status flag (RX(n+1)A) is turned off and the error code of the remote register write area is cleared (0000H).

The ON and OFF timing of each flag for the initial data processing request, processing complete, setting complete, and the setting request by the AJ65BT-64DAV/DAI:



: Executed by the sequence ladder

: Executed by the AJ65BT-64DAV/DAI

3.6 Remote Register

The AJ65BT-64DAV/DAI has a remote register (does not have backup) for data communication with the master module. The remote register allocation and data structure are described below.

3.6.1 Allocation of the remote register

The allocation of the remote register is shown in Table 3.6.

Table 3.6 Allocation of the remote register

	Address	Description	Initial value	Reference section
Write area (M→R)	RWwm	CH.1 digital value setting area	0	Section 3.6.2
	RWwm+1	CH.2 digital value setting area	0	
	RWwm+2	CH.3 digital value setting area	0	
	RWwm+3	CH.4 digital value setting area	0	
	RWwm+4	Analog output enable/disable area	0	Section 3.6.3
	RWwm+5	Unusable		
	RWwm+6			
	RWwm+7			
Read area (R→M)	RWrn	CH.1 set value check code	0	Section 3.6.4
	RWrn+1	CH.2 set value check code	0	
	RWrn+2	CH.3 set value check code	0	
	RWrn+3	CH.4 set value check code	0	
	RWrn+4	Error code	0	Section 3.6.5
	RWrn+5	Unusable		
	RWrn+6			
	RWrn+7			

m, n: The address set for the master station in the station number setting.

Point
Do not execute read or write to the remote register that is not allowed to use. When a read or write is executed, the function of the AJ65BT-64DAV/DAI is not guaranteed.

3.6.2 Digital value setting area for channels 1 through 4

(1) This area is used to write the digital value for the D/A conversion from the PLC CPU.

(2) The digital values at all channels become "0" in the following conditions:
(a) After the power is turned on, when the remote READY (RX(n+1)B) is turned on.
(b) After the reset of the PLC CPU, when the remote READY (RX(n+1)B) is turned on.

(3) The digital value can be set as 16-bit signed binary data and within the available setting range of the digital value resolution.
If a value beyond the range of the digital value resolution is set, the data in Table 3.7 is applied for the D/A conversion.
In addition, the checking code is stored in the set value checking code storage area (addresses from RWrn to RWrn+3).

Table 3.7 Available setting range of the digital value

Model Name	Available setting range	Digital value for the D/A conversion when the value beyond the range is set
AJ65BT-64DAV	-2048 to 2047 (Practical range: -2000 to 2000)	2048 or higher: 2047 -2049 or lower: -2048
AJ65BT-64DAI	0 to 4095 (Practical range: 0 to 4000)	4096 or higher: 4095 -1 or lower: 0

3.6.3 Analog output enable/prohibit channel

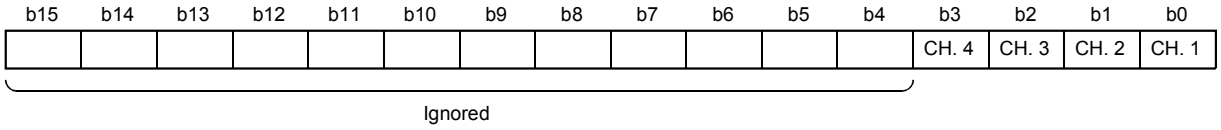
(1) Enable or prohibit of the external output of the analog value from each channel is set in this area.

(2) Output is prohibited at all channels in the following conditions:
(a) When the power is turned on.
(b) When the power is reset.
Note that when initial data processing is finished, (module ready turns on, and) the output is enabled at all channels with the default values of 0.

(3) Enable/prohibit of the external output is set to 0 or 1 for each channel.
(a) 0 ..... Enabled
(b) 1 ..... Prohibited

(4) Configuration of the output enable/prohibit area for each channel is as follows:

Configuration of the output enable/prohibit area for each channel



3.6.4 Set value checking code storage area for channels 1 through 4

This area is used to check if the digital value is within or out of the setting range. One of the following checking codes is stored when the digital value lower or higher than the setting range is set.

Check code list

Check code	Description
000F$_H$	A digital value which exceeds the setting range was set.
00F0$_H$	A digital value which is below the setting range was set.
00FF$_H$	Both a digital value below the setting range and digital value exceeding the setting range were set. For example, the 00FF$_H$ check code is stored if a digital value exceeding the valid range is written, and then, without the check code being reset, a digital value that falls short of the valid range is written.

(1) The check code once stored is not reset even if the set value is set to within the valid setting allowed range.

(2) The storage area or the set value check code is reset by turning on the error reset request flag (RY (n+1) A).

3.6.5 Error code

(1) If an error occurs when starting the module or writing data to the AJ65BT-64DAV/DAI (the RUN LED flashes), the following error code is stored in the error code (RWrn+4) in the AJ65BT-64DAV/DAI remote register.

Error code list

Error code	Error description	Processing
11□	The set digital value is outside the setting range. The □ indicates the channel number where the error occurred.	Correct the digital value to within the setting range.
999	The offset/gain setting values stored in E^2PROM became faulty.	Power-cycle the AJ65BT-64DAV/DAI again. If this recurs, the module may be faulty. Consult your local servicing company, dealer or our branch office.

The □ indicates the channel number where the error occurred.

(2) When multiple errors occurred, the error code of the first error is stored, but the other errors are not stored.

(3) The error code reset is performed by turning on the error reset request flag (RY (n+1) A).
When the error code is “999”, however, it cannot be reset because the hardware of the module is faulty.

4. SETUP AND PREPARATION BEFORE OPERATION

4.1 Precautions When Handling

The precautions when handling the AJ65BT-64DAV/DAI are described below:

⚠CAUTION

- Do not touch the terminals while the power is on.
  Doing so may cause malfunctioning.
- Be careful not to let foreign matter such as filings or wire chips get inside the module.
  These can cause fire, breakdowns and malfunctioning.
- Never disassemble or modify the module.
  This may cause breakdowns, malfunctioning, injury and/or fire.
- Do not touch the conducted area or electric parts of the module.
  Doing so may cause module malfunctioning or breakdowns.
- The module case is made from resin, so do not drop or apply strong shock to the module.
  This may cause the module to be damaged.
- Do not remove the module print board from the case.
  This may cause breakdowns.
- Tighten the terminal screws within the specified torque range.
  If the terminal screws are loose, it may result in, fire or malfunctioning.
- When disposing of this product, treat it as industrial waste.
- Use the module in the environment given in the general specifications of this Manual.
  Using the module outside the range of the general specifications may result in electric shock, fire or malfunctioning, or may damage or degrade the module.
- Secure the module with DIN rail or installation screws. Tighten the installation screws securely within the regulated torque range.
  Failure to do so may cause the damage of the module due to falling of the module.
- Mount or dismount the module to or from an enclosure after switching power off externally in all phases.
  Not doing so can cause the module to fail or malfunction.
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
  Failure to do so may cause a failure or malfunctions of the module.

(1) Tighten the screws such as module installation screws and terminal screws with the following torque :

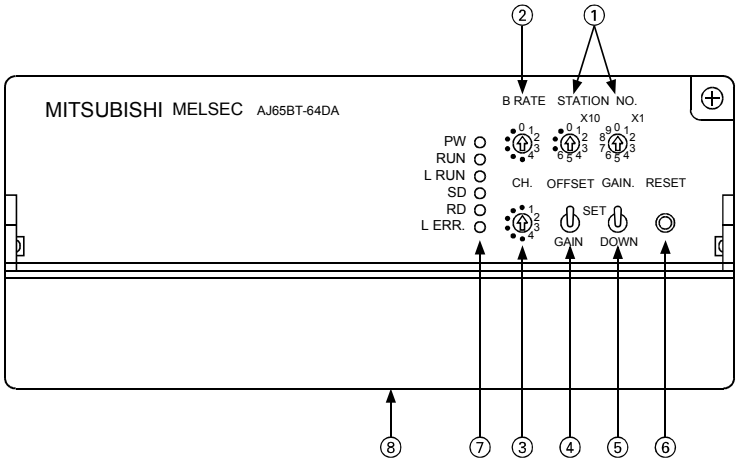
Screw location	Tightening torque range
Module installation screw (M4 screw)	78 to 118 N·cm
Terminal block terminal screw (M3.5 screw)	59 to 88 N·cm
Terminal block installation screw (M4 screw)	78 to 118 N·cm

(2) When using the DIN rail adapter, install the DIN rail by making sure of the following:
  (a) Applicable DIN rail models (conforming to JIS C 2812)
    TH35-7.5Fe
    TH35-7.5Al
    TH35-15Fe
  (b) DIN rail installation screw interval
    When installing the DIN rail, tighten the screws with less than 200mm (7.87 inch) pitches.

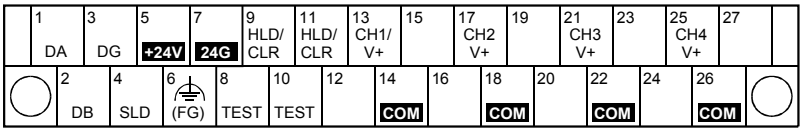
(3) Refer to the Master Module user's manual for the name, specification, and manufacturers of supported cables for the use with AJ65BT-64DAV/DAI.

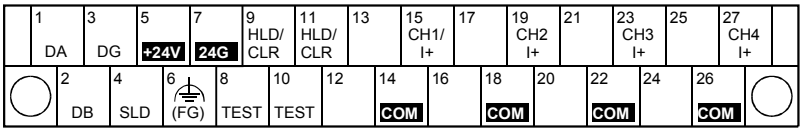
4.2 Name of Each Part

The name of each part in the AJ65BT-64DAV/DAI is described.



Number	Name	Description
①	Station number setting switch	↓×10, ↓×1 — The AJ65BT-64DAV/DAI station number is set within the range 1 to 63. (Factory shipment setting : 00)
②	B RATE (Transfer baud rate) setup switch	Setting number / Transfer baud rate: 0 — 156kbps(Factory shipment setting); 1 — 625kbps; 2 — 2.5Mbps; 3 — 5Mbps; 4 — 10Mbps. Unused (When a value other than 0 to 4 is set, L ERR. LED turns on, and results in a communication error.)
③	CH. (CHANNEL) selection switch	Select the channel to perform offset adjustment or gain adjustment. (Positions other than 1 to 4 are not processed.)
④	OFFSET/GAIN (Offset/gain) setting switch	The switch to set the offset/gain values during test mode. (1) OFFSET position : Calibration mode for the offset value (2) GAIN position : Calibration mode for gain value (3) SET position : When the switch is set from the OFFSET/GAIN position, which are modes to record offset/gain value to the SET position, to the SET position, the offset/gain value is recorded.
⑤	UP/DOWN switch	The switch to adjust the analog output value for the offset/gain of the specified channel. The analog output value increases/decreases by turning on the UP/DOWN switch.
⑥	RESET switch	Resets the H/W. Initializes the AJ65-BT-64DAV/DAI I/O signals, remote register, and operation processing. When the switch is turned on, AJ65BT-64DAV/DAI initial data processing request flag turns on.

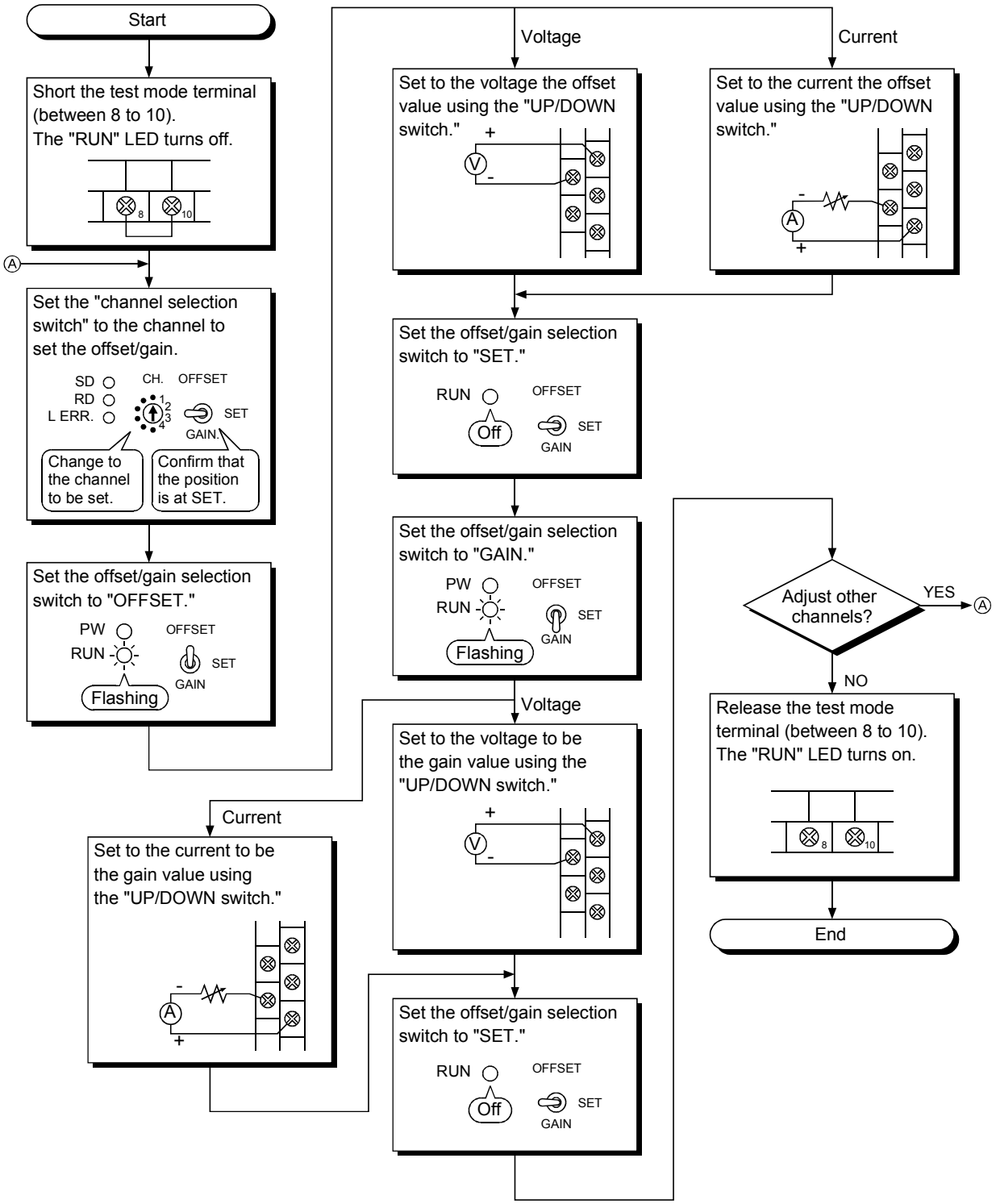
<table>
<tr><th>Number</th><th>Name</th><th>Description</th></tr>
<tr><td>⑦</td><td>Operation status display LED</td><td>
<table>
<tr><td>PW LED</td><td colspan="2">On : When the power is on
Off : When the power is shut off</td></tr>
<tr><td rowspan="2">RUN LED</td><td>Normal mode</td><td>On : Normal operation
Flashing : Write data error
Off : 24VDC power shutoff or watchdog timer error</td></tr>
<tr><td>Test mode</td><td>Flashing : Flashes in 0.5 second intervals when the offset/gain setting switch is at OFFSET or GAIN. Flashes in 0.1 second intervals when exceeding the upper or lower limits of the allowable setting using the UP/DOWN switch.
Off : When the offset/gain setting switch is at SET.</td></tr>
<tr><td>L RUN LED</td><td colspan="2">On : Normal communication
Off : Communication interrupted (timeout error)</td></tr>
<tr><td>SD LED</td><td colspan="2">On : Data being transferred</td></tr>
<tr><td>RD LED</td><td colspan="2">On : Data being received</td></tr>
<tr><td>L ERR. LED</td><td colspan="2">On : When the baud rate or the station number setting is out of range.
Flashing at regular intervals : When the baud rate or station number setting is changed after power-on or reset.
Flashing at irregular intervals : When you forgot fitting the termination resistors or the module or CC-Link dedicated cable is affected by noise.
Off : Normal communication</td></tr>
</table>
</td></tr>
<tr><td>⑧</td><td>Terminal block</td><td>AJ65BT-64DAV
 

AJ65BT-64DAI
 

HLD/CLR setting terminal
....HOLD is set by shorting between terminals, and CLEAR is set by releasing.
Test mode setting terminal
....By shorting between terminals, the system enters the test mode</td></tr>
</table>

4.3 Offset/Gain Setting

When changing the I/O conversion characteristics, follow the procedure below.



Point

(1) Set the offset and gain values in the actual usage state.

(2) The offset and gain values are stored in the AJ65BT-64DAV/DAI, and are not erased even the power supply is shut off.

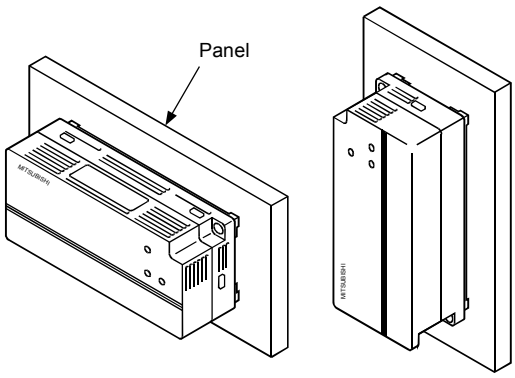
(3) Perform the offset/gain setting when the PLC CPU is stopped. When in the test mode, D/A conversion is stopped for all channels, so use the remote READY signals as an interlock.

(4) Perform the offset/gain setting in the range from DC -10 to +10V or from 4 to +20mA. When the setting exceeds this range, the maximum resolution or total precision may not be in the range indicated in the performance specification.

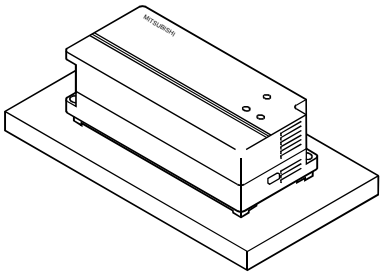
4.4 Station Number Setting

By the AJ65BT-64DAV/DAI station number setting, the addresses to store the control I/O signal data and read/write data are determined.
For details, refer to the user's manual of the master module used.

4.5 Facing Direction of the Module Installation



When the module is installed next to the panel



When the module is installed on the panel

4.6 Data link Cable Wiring

The wiring of the CC-Link dedicated cable which connects the AJ65BT-64DAV/DAI and the master module is described.

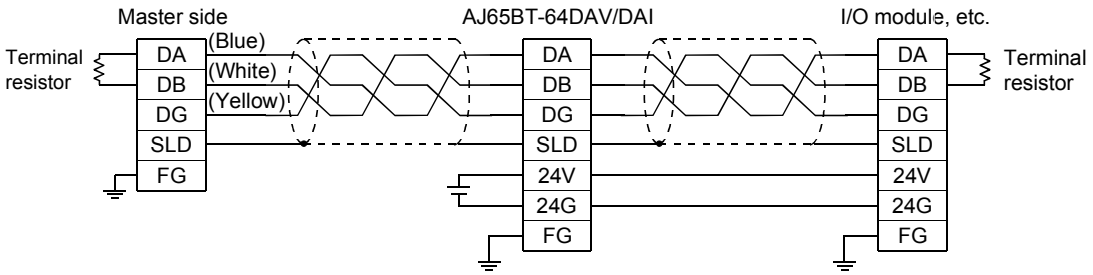
4.6.1 Precautions when handling the twisted pair cable

Do not handle the CC-Link dedicated cable in extreme ways as bellow, for the cable may be damaged:

(1) Compact with a sharp object
(2) Twist the cable excessively.
(3) Pull the cable hard. (more than the permitted elasticity.)
(4) Step on the cable.
(5) Place an object on the top.
(6) Scratch the cable's protective layer.

4.6.2 CC-Link dedicated cable connections

The CC-Link dedicated cable connections between the AJ65BT-64DAV/DAI and master module are as follows:



4.7 Wiring

Precautions when wiring the AJ65BT-64DAV/DAI and how to wire to the external devices are explained.

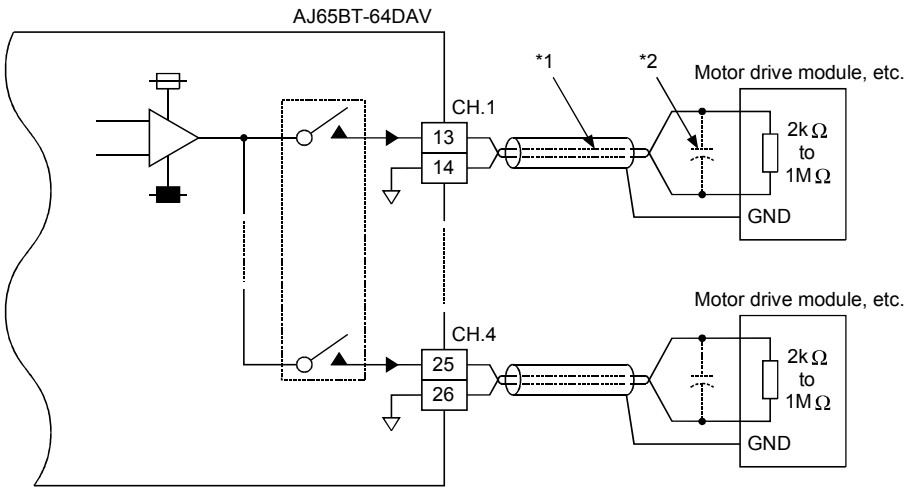
4.7.1 Precautions when wiring

To obtain maximum performance from the functions of AJ65BT-64DAV/DAI and improve the system reliability, an external wiring with high durability against noise is required.
The precautions performing external wiring for the AJ65BT-64DAV/DAI are shown below:

(1) Use separate cables for the AC and AJ65BT-64DAV/DAI external input signals, in order not to be affected by the AC side surge or conductivity.
(2) Do not bunch the control wires or load cables from other than the PLC with the wires to the module, or install them close to each other. Doing this makes the wiring easy to accept the noise, surge or induction effects.
(3) Perform a one-point grounding for the shielded line or the shield of the shielded cable.

4.7.2 Wiring between the AJ65BT-64DAV/DAI and external devices

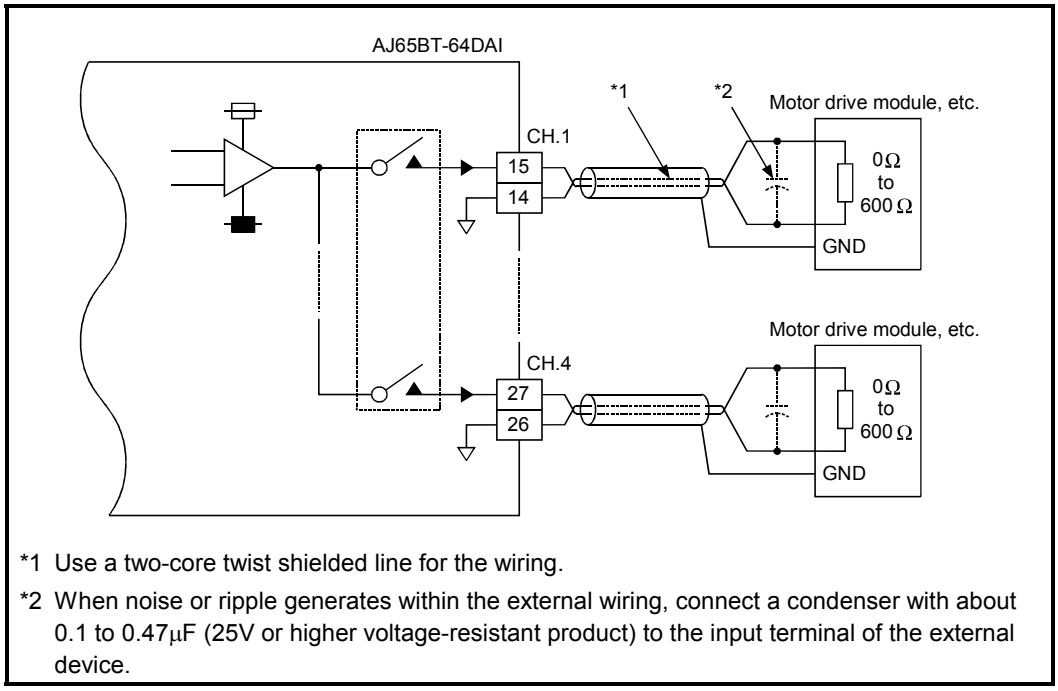
(1) Wiring example of the AJ65BT-64DAV and external devices is shown in Figure 4.1.



*1 Use a two-core twist shielded line for the wiring.
*2 When noise or ripple generates within the external wiring, connect a condenser with about 0.1 to 0.47μF (25V or higher voltage-resistant product) to the input terminal of the external device.

Figure 4.1 Wiring example of the AJ65BT-64DAV and external devices

(2) Wiring example of the AJ65BT-64DAI and external devices is shown in Figure 4.2.



*1 Use a two-core twist shielded line for the wiring.

*2 When noise or ripple generates within the external wiring, connect a condenser with about 0.1 to 0.47μF (25V or higher voltage-resistant product) to the input terminal of the external device.

Figure 4.2 Wiring example of the AJ65BT-64DAI and external devices

Remark

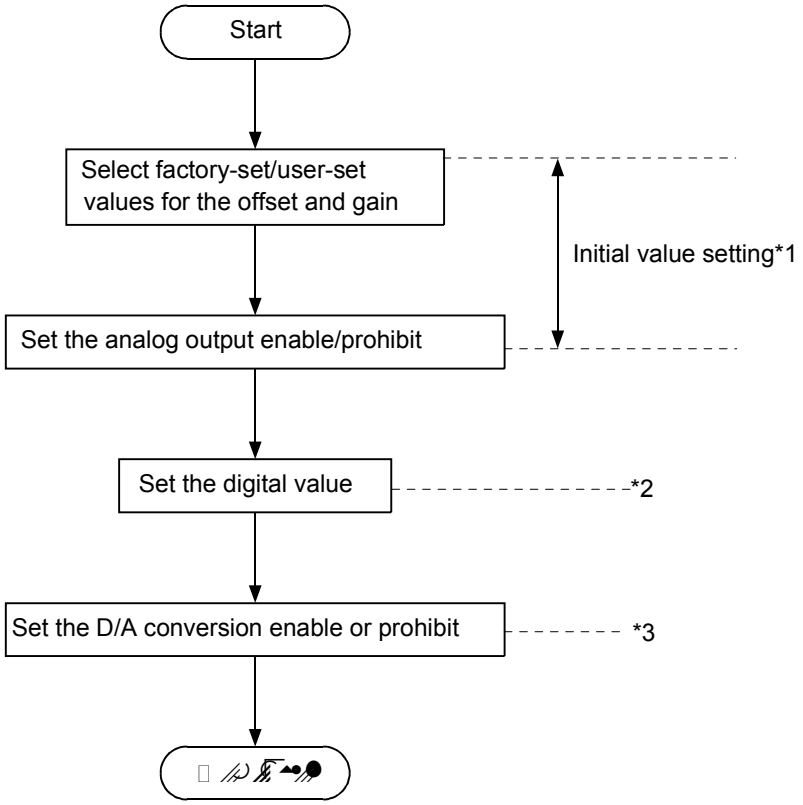
Though you can perform the jumper wiring of the common line on the external device side, the commons are connected also inside this module.
When wiring, be careful of sneak currents on the external device side.

5. PROGRAMMING

The programming procedure, basic read/write programs, and program examples for the AJ65BT-64DAV/DAI are described.
When applying any of the program examples introduced in this chapter to the actual system, verify the applicability and confirm that no problems will occur in the system control.
Refer to the user's manual of the master module used for the master module, to Section 3.6 for the remote registers, and to the AnSHCPU/AnACPU/AnUCPU/QCPU (A mode) Programming Manual (Dedicated Instructions) for details of the dedicated instructions.

5.1 Programming Procedure

Create programs for executing the digital-analog conversion of the AJ65BT-64DAV/DAI in the following procedure.



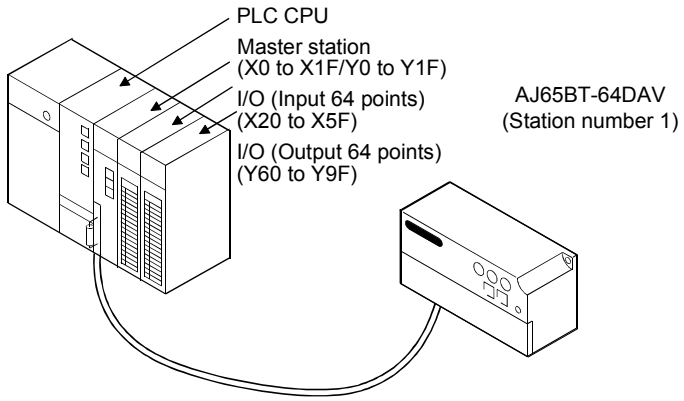
*1 When using the QCPU (Q mode), you can use the remote device station initialization procedure registration function to make settings. When using the ACPU, QCPU (A mode) or QnACPU, use the sequence program to make settings.

*2 The remote device station initialization procedure registration function cannot be used to make settings.
Use the sequence program to make settings.

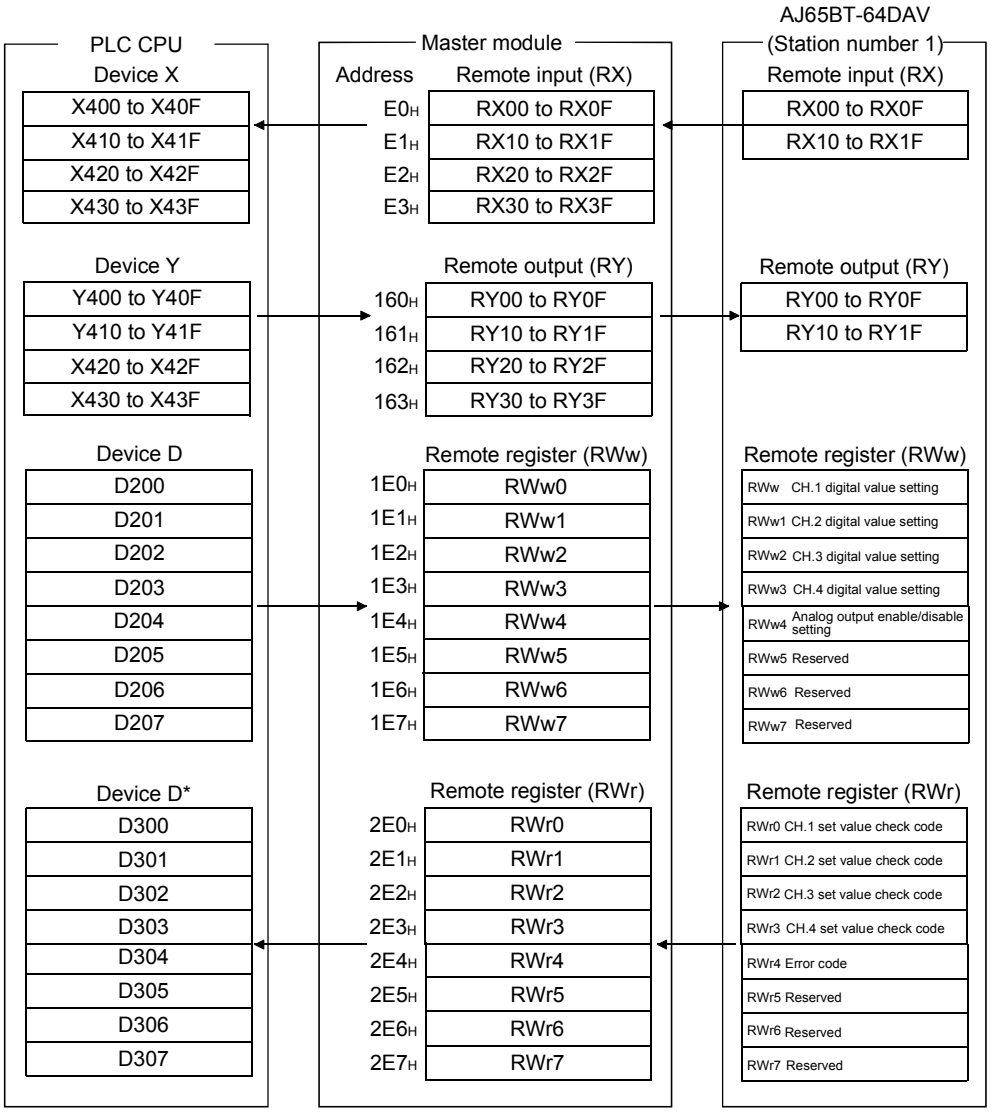
5.2 Conditions of Program Example

The program examples in this chapter are created under the following conditions.

(1) System configuration



(2) Relationships between PLC CPU, master module and AJ65BT-64DAV



* 1 In the program example (refer to Section 5.5) that uses the RRPA instruction (automatic refresh parameter setting) with the ACPU/QCPU (A mode), RWr0 to RWr3 are assigned to D456 to D459.

* 2 Although RX20 to RX3F and RY20 to RY3F are not used in the AJ65BT-64DAV, devices for them are reserved in a master module or CPU module.

POINT

Some CPU modules may not accept the devices used in the program example in this chapter. For the setting ranges of the devices, refer to the user's manual of the CPU module used.

For the A1SHCPU, for example, devices X100, Y100 and later are unusable. Use such devices as B and M.

(3) Initial settings

Setting Item	Settings
Offset/gain value selection	Factory setting
Analog output enable/disable setting (RWw4)	Channels 1, 2, 3, 4: enable

(4) Other settings

Setting Item	Settings
CH.1 digital value (RWw0)	50
CH.2 digital value (RWw1)	100
CH.3 digital value (RWw2)	200
CH.4 digital value (RWw3)	3000
CH.1 analog output enable/disable flag (RY00)	Enable
CH.2 analog output enable/disable flag (RY01)	Enable
CH.3 analog output enable/disable flag (RY02)	Enable
CH.4 analog output enable/disable flag (RY03)	Enable

5.3 Program Example for Use of the QCPU (Q mode)

The program examples in this section are created under the following conditions.
GX Developer is used to set the network and automatic refresh parameters.
Using the remote device station initialization procedure registration function facilitates initial settings.

(1) Parameter setting

(a) Network parameter setting

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay infomation setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

Station No.	Station type	Expanded cyclic setting	Exclusive station count	Remote station points	Reserve/invalid station select	Intelligent buffer select(word) Send	Receive	Automatic
1/ 1	Remote device station	single	Exclusive station 2	64 points	No setting			

(b) Automatic refresh parameter setting

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RWr)	D300
Remote register(RWw)	D200
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	SB0
Special register(SW)	SW0
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay infomation setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

(2) Initial setting by remote device station initialization procedure registration

(a) Setting the target station number

Set the station number to which initial setting will be made.

Set the target station number to "1".

Remote device station initial setting: Target station number setting: Module 1

	Target station No.	No. of registered procedures			Target station No.	No. of registered procedures	
1	1	0	Regist procedure	9			Regist procedure
2			Regist procedure	10			Regist procedure

(b) Setting the procedure registration

When the initial data processing request flag (RX18) turns on and the remote device station initialization procedure registration (SB0D) is set, the following data are registered to the AJ65BT-64DAV.

Procedure Execution Condition	Execution
Initial data processing request flag (RX18) turns on	Offset/gain value selection (RY04) is turned on (factory setting).
	Analog output enable/disable setting: channels 1, 2, 3, 4: enable (RWw4: 0000H)
	Initial data processing completion flag (RY18) is turned on.
	Initial data setting request flag (RY19) is turned on.
Initial data processing request flag (RX18) turns off	Initial data processing completion flag (RY18) is turned off.
Initial data setting completion flag (RX19) turns on	Initial data setting request flag (RY19) is turned off.

(c) Setting results

The setting results are shown below.

Remote device station initial setting: Procedure registration module 1: Target station 1

Input format: DEC.

Execute Flag	Operational condition	Executional condition			Details of execution		
		Condition Device	Device Number	Execute Condition	Write Device	Device Number	Write Data
Execute	Set new	RX	18	ON	RY	04	ON
Execute	Same as prev.set	RX	18	ON	RWw	04	0
Execute	Same as prev.set	RX	18	ON	RY	18	ON
Execute	Same as prev.set	RX	18	ON	RY	19	ON
Execute	Set new	RX	18	OFF	RY	18	OFF
Execute	Set new	RX	19	ON	RY	19	OFF

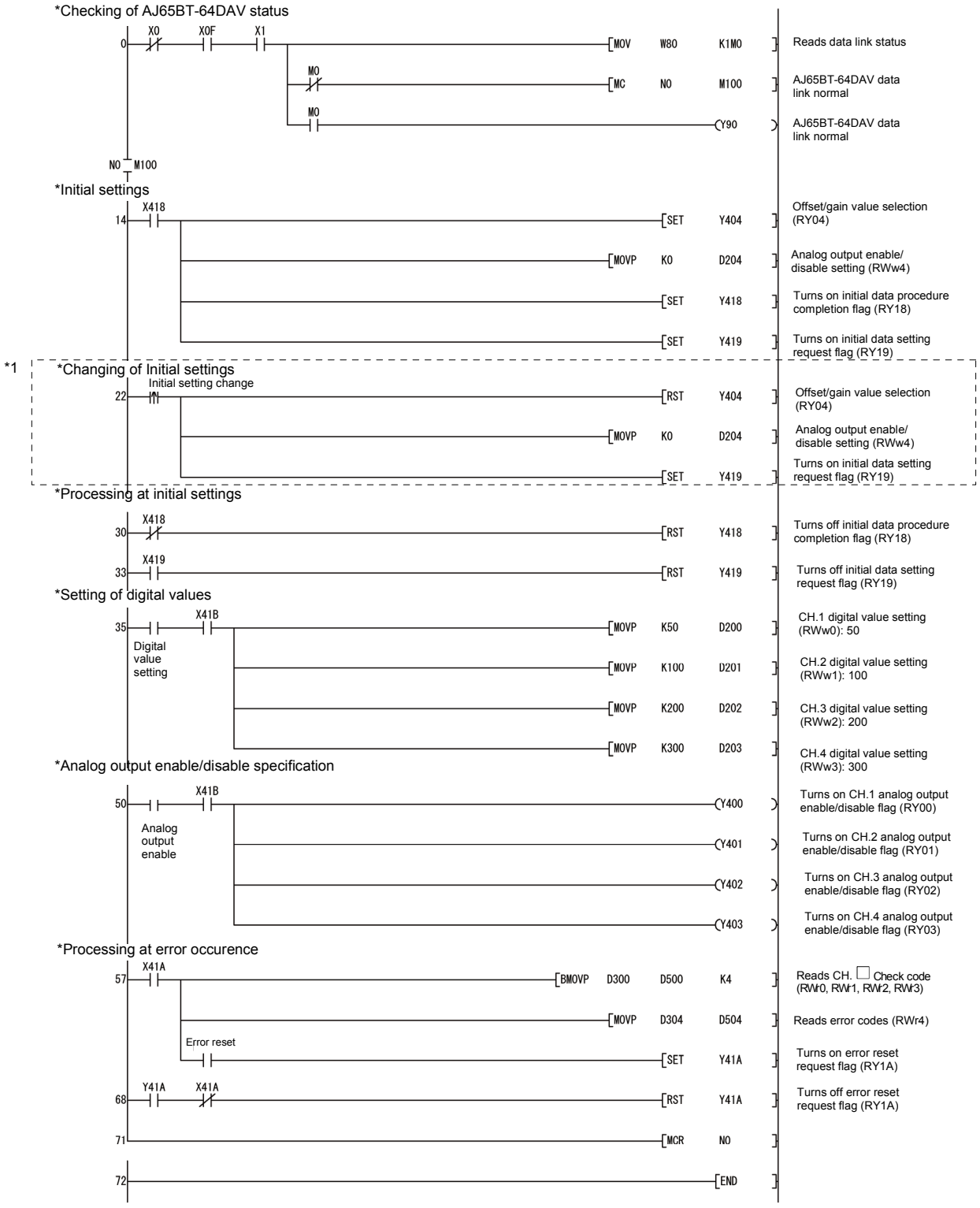
POINT

(1) If the remote device station initialization procedure registration directive (SB000D) is turned off after the initial processing, all RY signals that were turned on within the initial procedure registration turn off. Hence, turn on the "CH. ☐ analog output enable/disable flag (RYn0, RYn1, RYn2, RYn3)" in the sequence program.

(2) When the initial setting (analog output enable/disable setting (RWwm+4)) has been changed, the remote device station initialization procedure registration function cannot be used.
Change the initial setting in the sequence program.

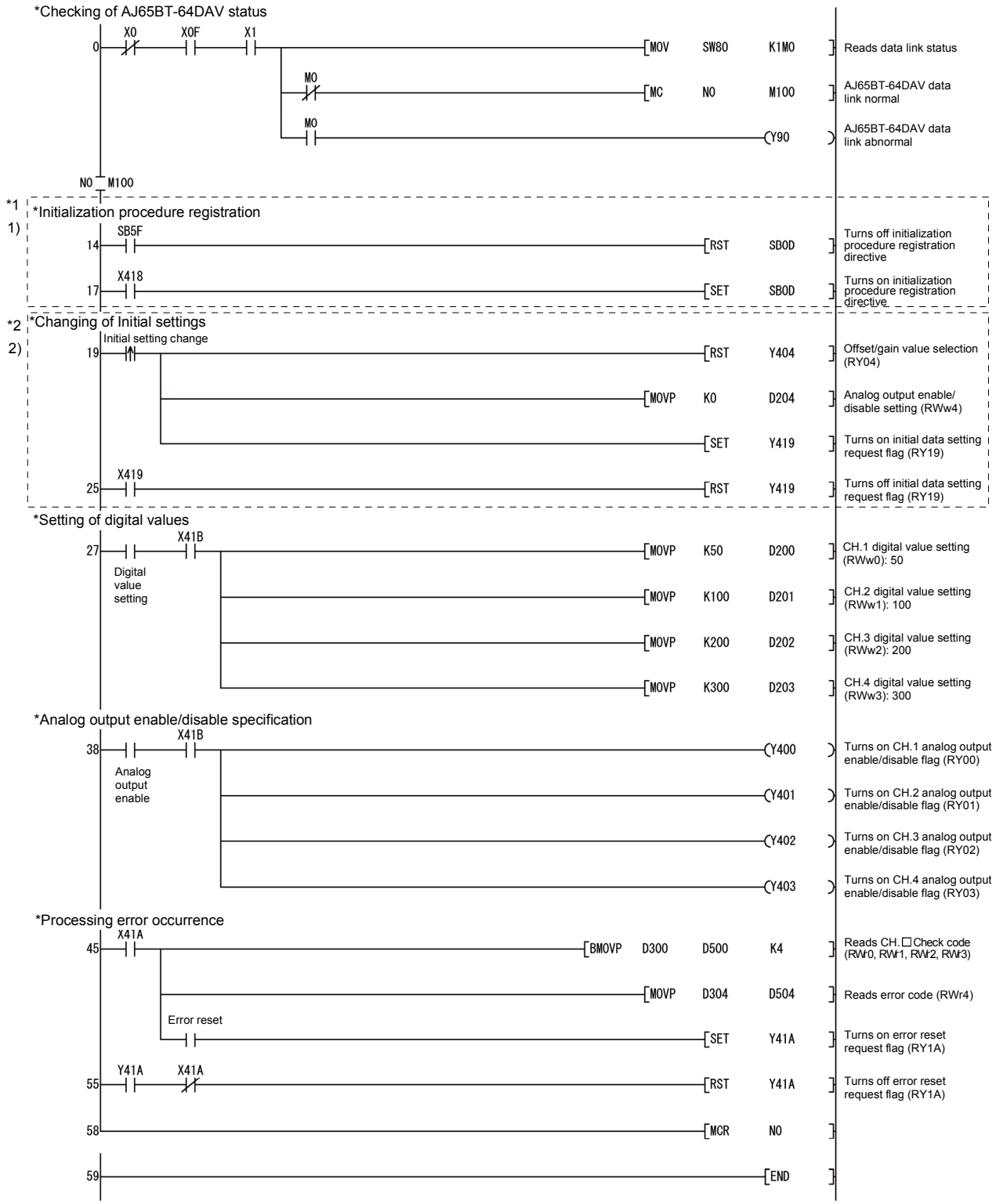
(3) For the case where the remote device station initialization procedure registration function is not used but a sequence program is used to make setting, refer to the user's manual of the used master module.

(3) Program example

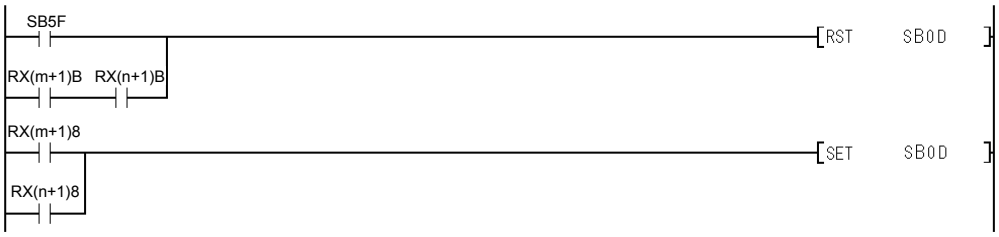


*1: The program enclosed by the dotted line is necessary only when the initial settings are changed.

(4) Program example



*1 When remote device station initialization procedure registration is to be made to multiple modules, correct the program part enclosed by the dotted line 1) as shown below.
RX(m+1)B/RX(n+1)B indicates remote READY, and RX(m+1)8/RX(n+1)8 indicates an initial data processing request flag. The device number changes depending on the station number. Insert the remote READY and initial data processing request flags for all stations where remote device station initialization procedure registration has been set.



Note that the master module can register the initialization procedure of only the specified station out of the multiple remote device stations.
The master module supporting this function is the QJ61BT11N which serial No's first 5 digits is 08032 or later.
For details, refer to the CC-Link System Master/Local Module User's Manual, "CHAPTER 4 FUNCTIONS"

*2 The program part enclosed by the dotted line 2) is request only when the initial setting is changed.

5.4 Program Example for Use of the QnACPU

GX Developer is used to set the network and automatic refresh parameters.

(1) Parameter setting

(a) Network parameter setting

	1
Start I/O No.	0000
Type	Master station
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop
Scan mode setting	Asynchronously
Delay information setting	0
Station information setting	Station information

StationNo.	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word)		
				Send	Receive	Automatic
1/1	Remote device station	Exclusive station 2	No setting			

(b) Automatic refresh parameter setting

	1
Start I/O No.	0000
Type	Master station
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RWr)	D300
Remote register(RWw)	D200
Special relay(SB)	B0
Special register(SW)	W0
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop
Scan mode setting	Asynchronously
Delay information setting	0
Station information setting	Station information

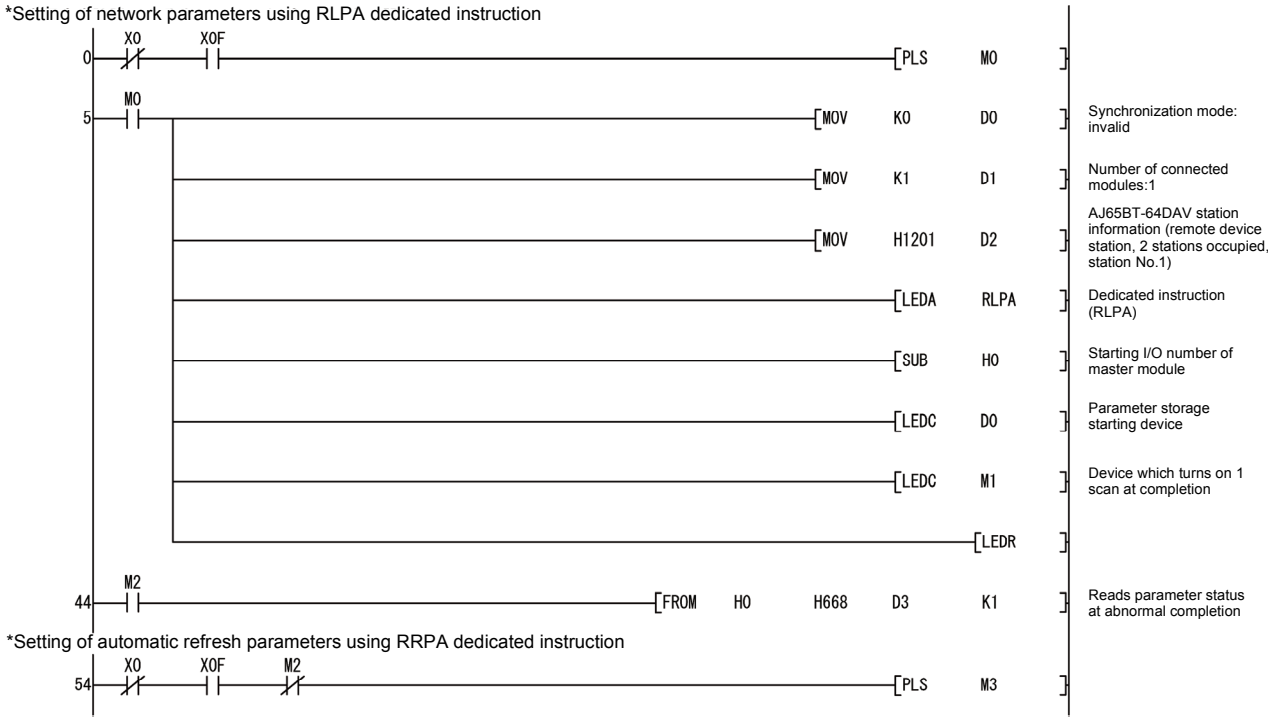
POINT

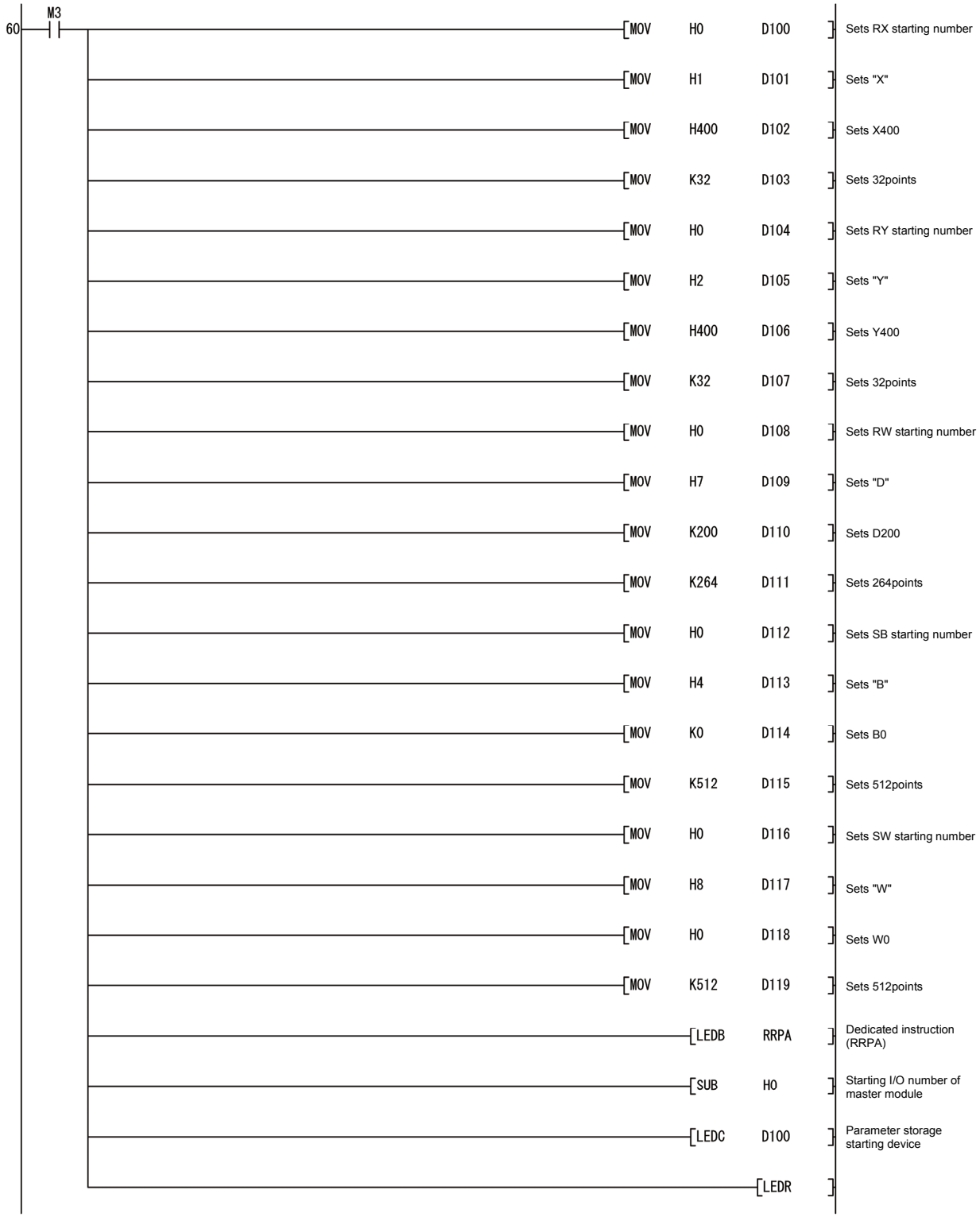
When the QnACPU is used, using "Y" as the remote output (RY) refresh device of the automatic refresh parameter may not hold the analog value even for the HOLD setting.
For the HOLD setting, use "M" or "B" as the remote output (RY) refresh device.

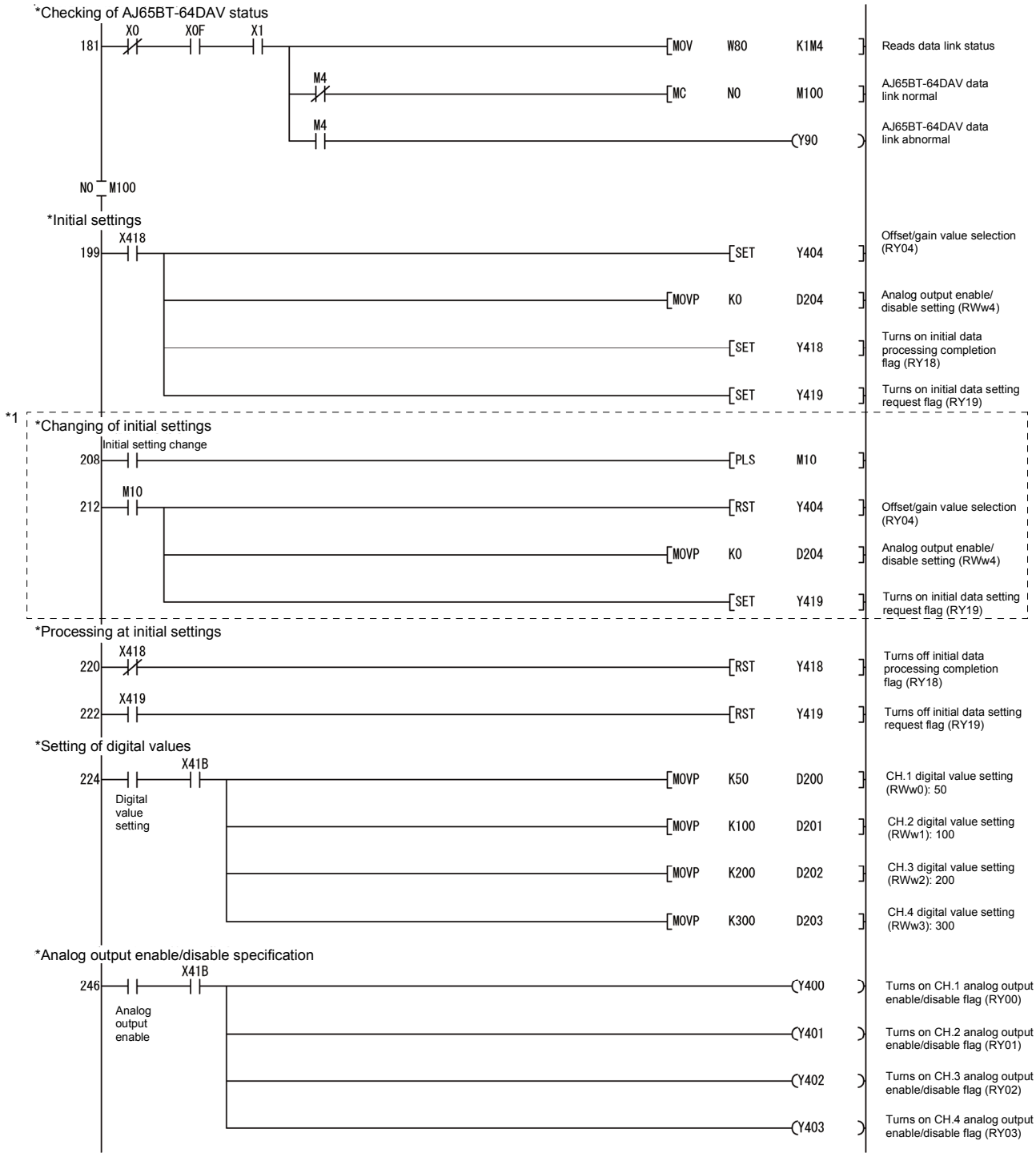
5.5 Program Example for Use of the ACPU/QCPU (A mode) (dedicated instructions)

A sequence program is used to set the network and automatic refresh parameters.

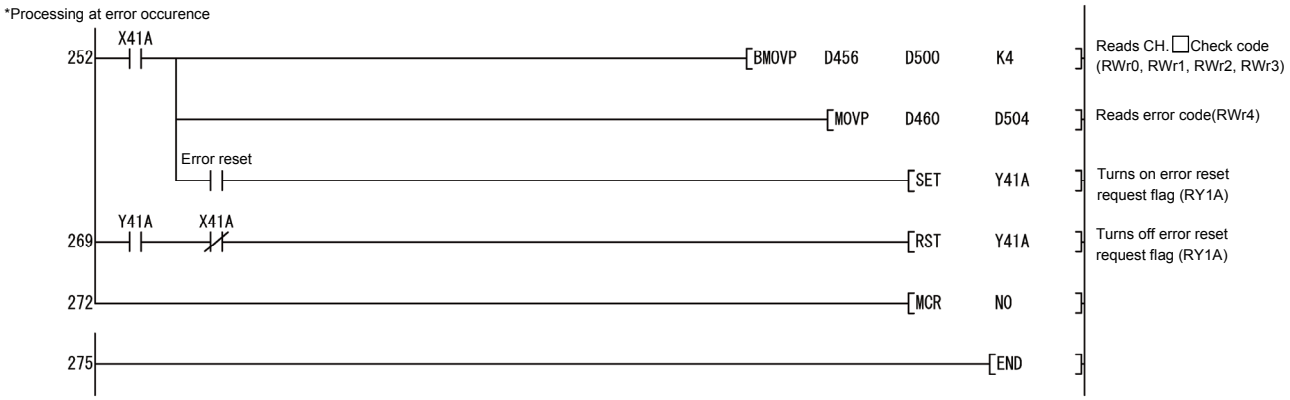
(1) Program example



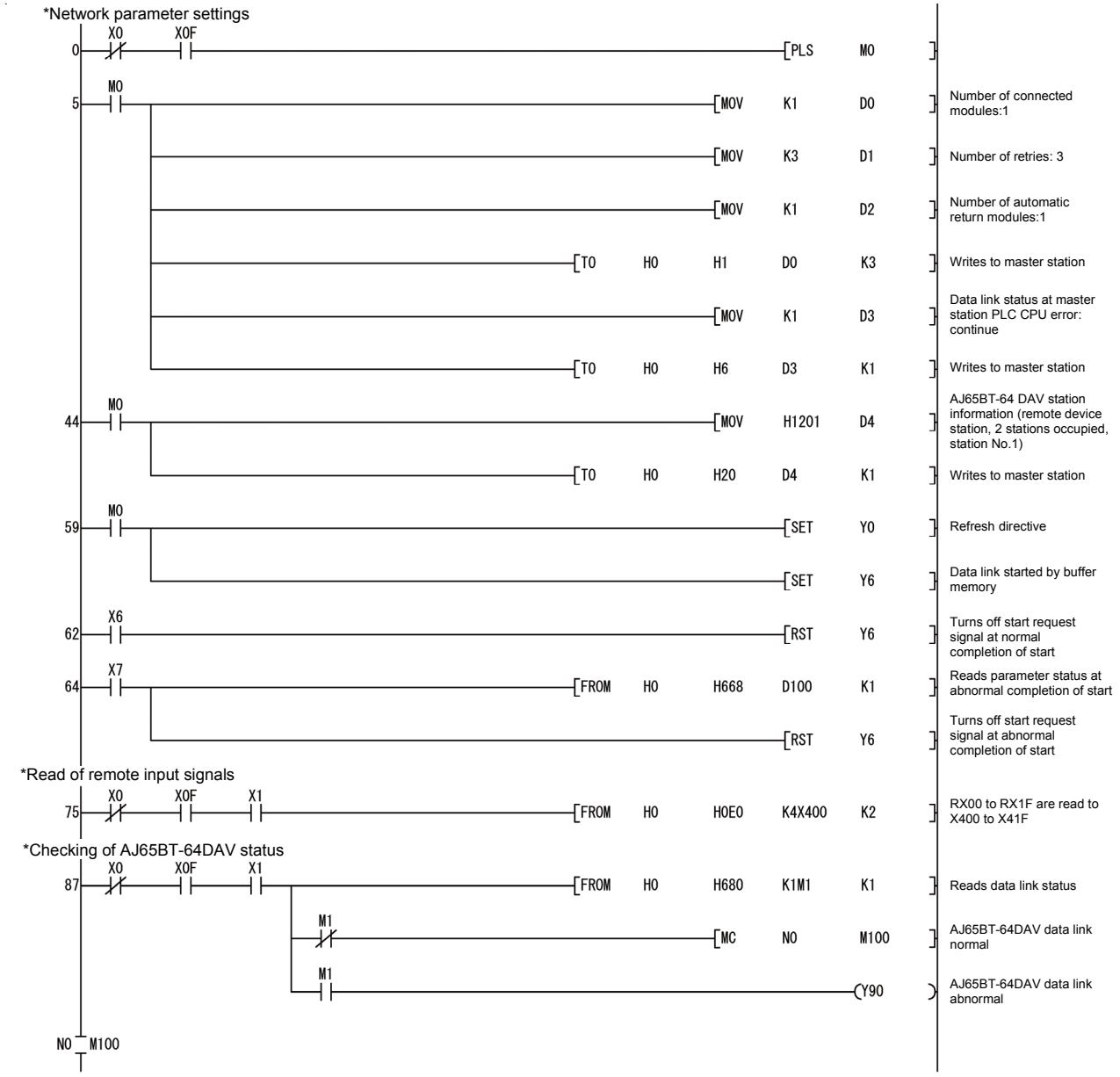

60
M3
MOV H0 D100 Sets RX starting number
MOV H1 D101 Sets "X"
MOV H400 D102 Sets X400
MOV K32 D103 Sets 32points
MOV H0 D104 Sets RY starting number
MOV H2 D105 Sets "Y"
MOV H400 D106 Sets Y400
MOV K32 D107 Sets 32points
MOV H0 D108 Sets RW starting number
MOV H7 D109 Sets "D"
MOV K200 D110 Sets D200
MOV K264 D111 Sets 264points
MOV H0 D112 Sets SB starting number
MOV H4 D113 Sets "B"
MOV K0 D114 Sets B0
MOV K512 D115 Sets 512points
MOV H0 D116 Sets SW starting number
MOV H8 D117 Sets "W"
MOV H0 D118 Sets W0
MOV K512 D119 Sets 512points
LEDB RRPA Dedicated instruction (RRPA)
SUB H0 Starting I/O number of master module
LEDC D100 Parameter storage starting device
LEDR

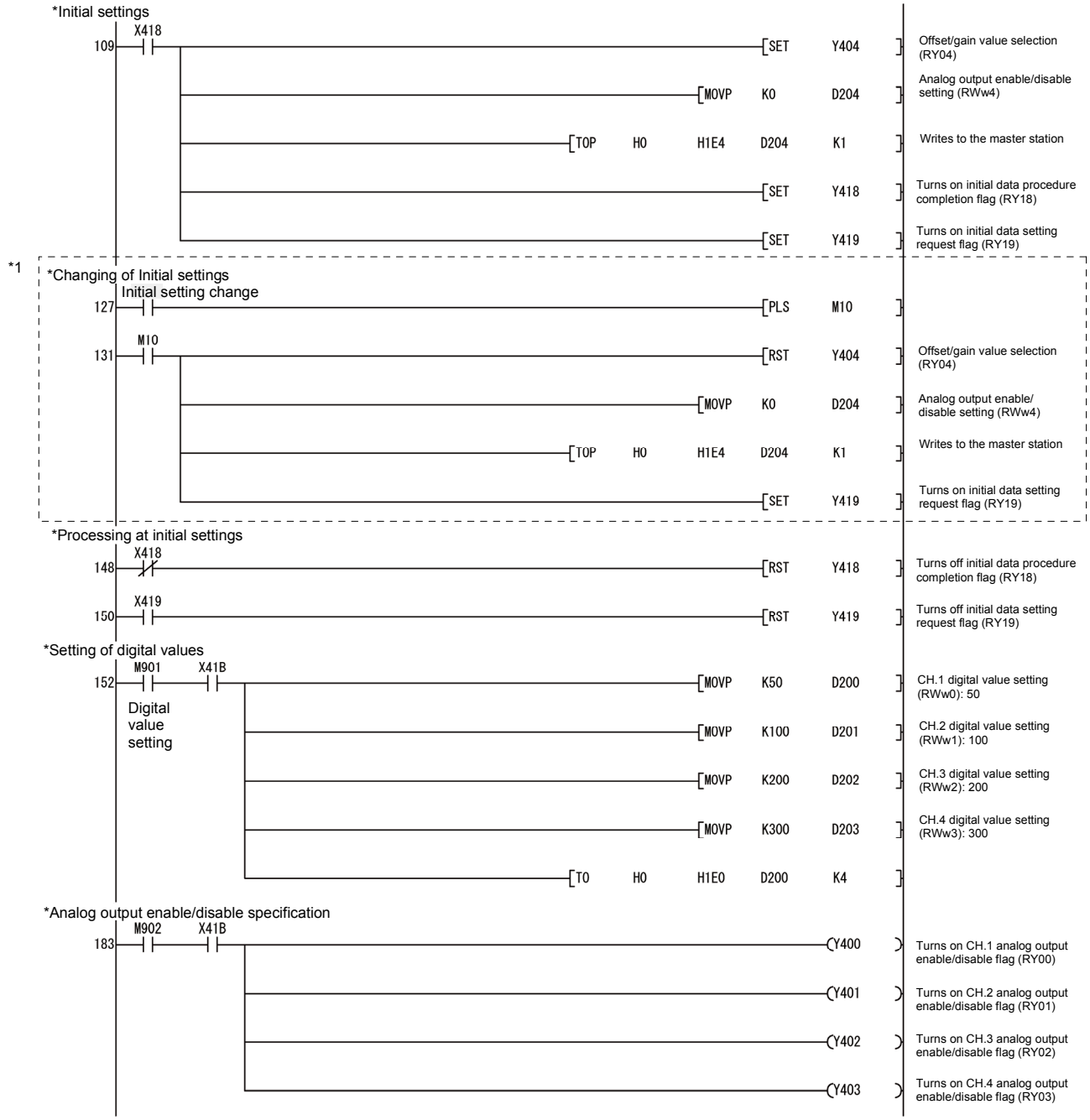


*1: The program enclosed by the dotted line is necessary only when the initial settings are changed.


*Processing at error occurence
X41A
252
BMOVP D456 D500 K4
Reads CH.□Check code (RWr0, RWr1, RWr2, RWr3)
MOVP D460 D504
Reads error code(RWr4)
Error reset
SET Y41A
Turns on error reset request flag (RY1A)
Y41A X41A
269
RST Y41A
Turns off error reset request flag (RY1A)
272
MCR N0
275
END

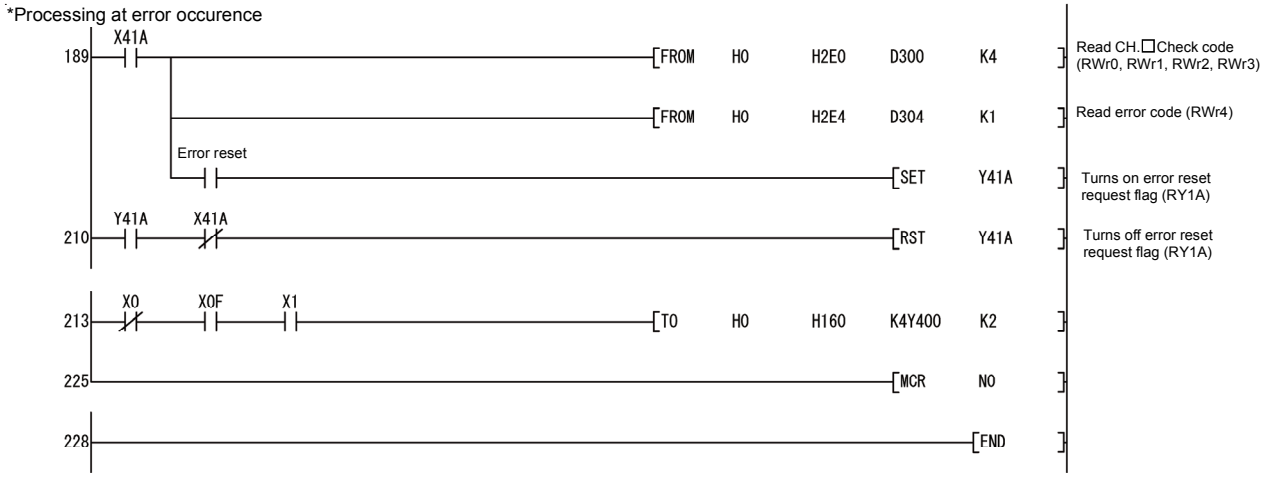
5.6 Program Example for Use of the ACPU/QCPU (A mode) (FROM/TO instructions)


*Network parameter settings
0 X0 X0F [PLS M0]
5 M0 [MOV K1 D0] Number of connected modules:1
[MOV K3 D1] Number of retries: 3
[MOV K1 D2] Number of automatic return modules:1
[TO H0 H1 D0 K3] Writes to master station
[MOV K1 D3] Data link status at master station PLC CPU error: continue
[TO H0 H6 D3 K1] Writes to master station
44 M0 [MOV H1201 D4] AJ65BT-64 DAV station information (remote device station, 2 stations occupied, station No.1)
[TO H0 H20 D4 K1] Writes to master station
59 M0 [SET Y0] Refresh directive
[SET Y6] Data link started by buffer memory
62 X6 [RST Y6] Turns off start request signal at normal completion of start
64 X7 [FROM H0 H668 D100 K1] Reads parameter status at abnormal completion of start
[RST Y6] Turns off start request signal at abnormal completion of start
*Read of remote input signals
75 X0 X0F X1 [FROM H0 H0E0 K4X400 K2] RX00 to RX1F are read to X400 to X41F
*Checking of AJ65BT-64DAV status
87 X0 X0F X1 [FROM H0 H680 K1M1 K1] Reads data link status
M1 [MC N0 M100] AJ65BT-64DAV data link normal
M1 (Y90) AJ65BT-64DAV data link abnormal
N0 M100



*1:The program enclosed by the dotted line is necessary only when the initial settings are changed.

*Processing at error occurence



6. TROUBLESHOOTING

The details of the errors which may occur when using the AJ65BT-64AD and troubleshooting are described.

6.1 Error Code List

When the data is written from the PLC CPU to the master module, and an error occurs (AJ65BT-64DAV/DAI RUN LED flashes), the error code is stored to the AJ65BT-64DAV/DAI remote register RWrn+4.
Refer to Section 3.6.5 for the error code.

6.2 Troubleshooting

A simple troubleshooting method for using the AJ65BT-64DAV/DAI is described.
Refer to the PLC CPU and Master Module User's Manuals regarding problems related to the PLC CPU and master module.

(a) When the AJ65BT-64DAV/DAI RUN LED is flashing

Check item	Corrective action
There in an error in the write data.	Check the cause of the error using the error code, and correct the sequence program.
Is there a short between the TEST terminals (test mode)?	Release between the TEST terminals after adjusting the offset/gain.
Is it flashing in 0.1s intervals (fast-speed) in test mode?	Change the offset/gain adjustment to within the allowable range.

(b) When the AJ65BT-64DAV/DAI RUN LED is off

Check item	Corrective action
Is the 24VDC power on?	Check the power. (External power supply)
Is the 24VDC power voltage at the regulated value?	Set the voltage within the range 18 to 30V.
Is there a short between the TEST terminals(test mode)?	Release the TEST terminal after adjusting the offset/gain.

(c) When the AJ65BT-64DAV/DAI LINK RUN LED turns off

Refer to the master module troubleshooting section.

(d) When the AJ65BT-64DAV/DAI LINK ERR LED is flashing

Check item	Corrective action
<Flashing at regular intervals> Was the station number or baud rate switch setting changed during normal operation?	Return to the station number or baud rate used during normal operation.
<Flashing at irregular intervals> ☐You forgot fitting the termination resistors.	Check whether the termination resistors are fitted or not. If not, connect them and switch power on again.
☐The module or CC-Link dedicated cable is affected by noise.	☐Earth both ends of the shield wire of the CC-Link dedicated cable to the protective earth conductors via SLD and FG of the corresponding module. ☐Securely earth the FG terminal of the module to the protective earth conductor. ☐Securely earth the piping when running the wiring inside piping.

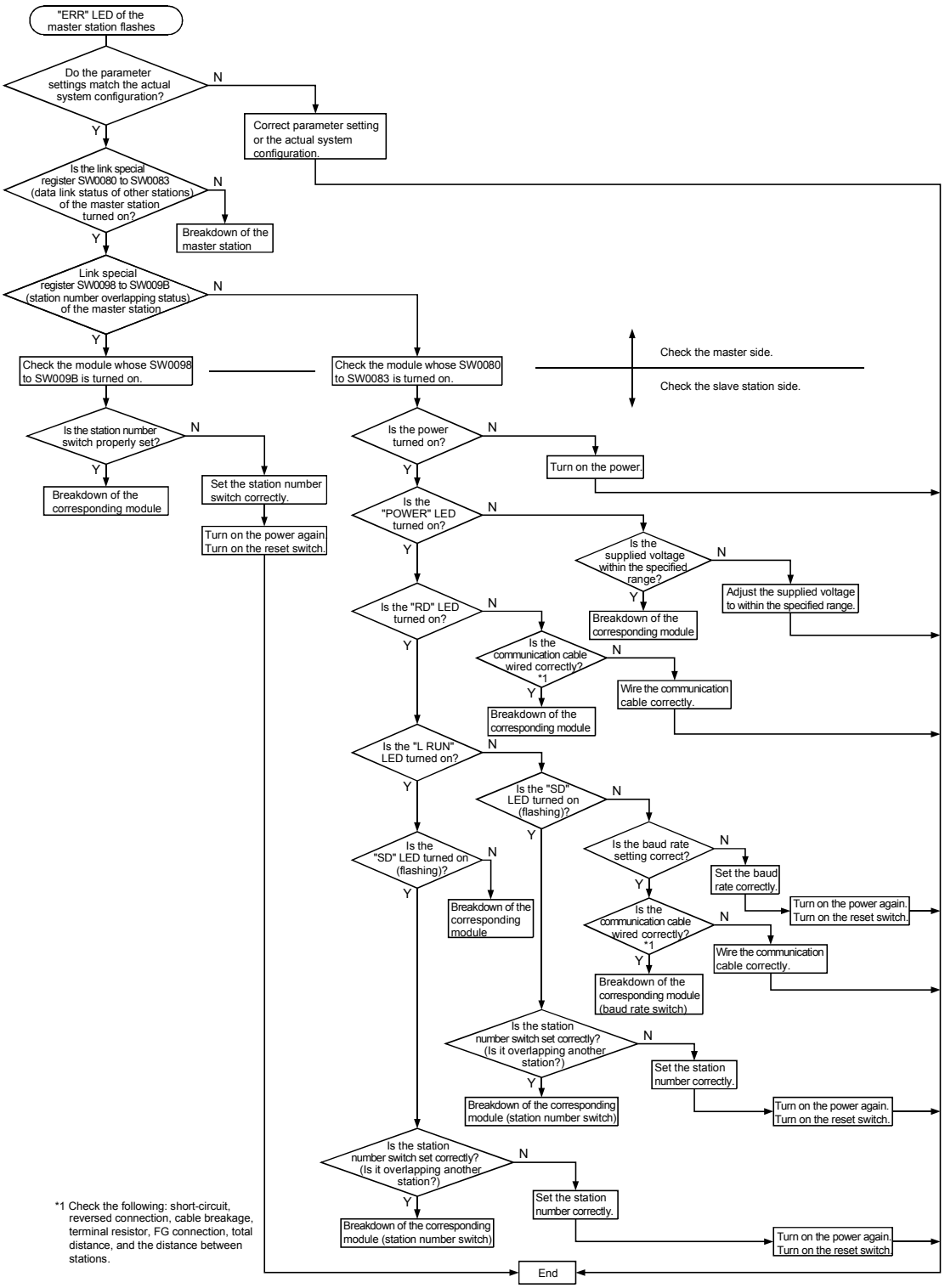
(e) When the AJ65BT-64DAV/DAI LINK ERR LED is on

Check item	Corrective action
Is the station number of baud rate setting correct?	Set a correct station number or baud rate.

6.2.1 When a communication fault occurs between the master station and this module

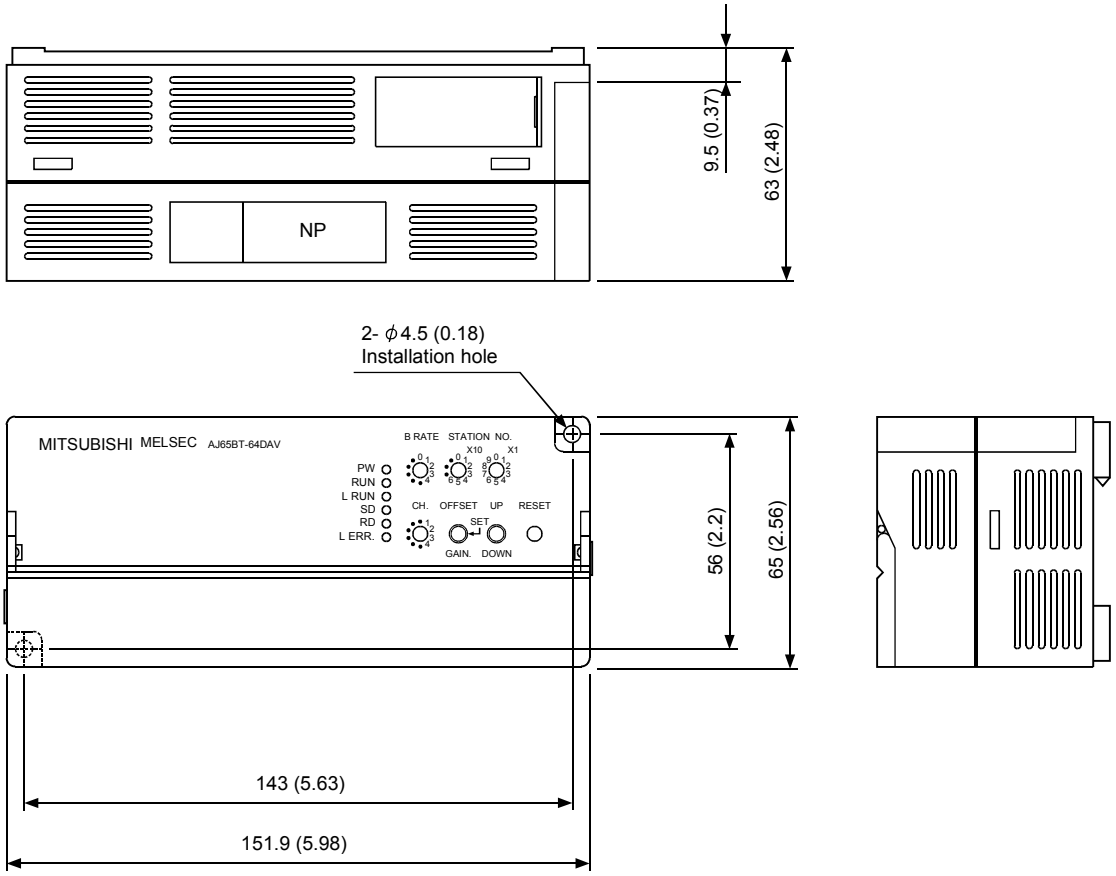
If the station-number-overlapping bit is turned on in the link special resister SW0098 to SW009B (station number overlapping status), check the AJ65BT-64DAV/DAI module of the corresponding station number by following the flow shown below:

Troubleshooting flow when the ERR LED on the master station is flashing


"ERR" LED of the master station flashes
Do the parameter settings match the actual system configuration?
N
Correct parameter setting or the actual system configuration.
Y
Is the link special register SW0080 to SW0083 (data link status of other stations) of the master station turned on?
N
Breakdown of the master station
Y
Link special register SW0098 to SW009B (station number overlapping status) of the master station
N
Y
Check the module whose SW0098 to SW009B is turned on.
Check the module whose SW0080 to SW0083 is turned on.
Check the master side.
Check the slave station side.
Is the station number switch properly set?
N
Y
Breakdown of the corresponding module
Set the station number switch correctly.
Turn on the power again Turn on the reset switch.
Is the power turned on?
N
Turn on the power.
Y
Is the "POWER" LED turned on?
N
Y
Is the supplied voltage within the specified range?
N
Adjust the supplied voltage to within the specified range.
Y
Breakdown of the corresponding module
Is the "RD" LED turned on?
N
Y
Is the communication cable wired correctly? *1
N
Wire the communication cable correctly.
Y
Breakdown of the corresponding module
Is the "L RUN" LED turned on?
N
Y
Is the "SD" LED turned on (flashing)?
N
Y
Is the baud rate setting correct?
N
Set the baud rate correctly.
Y
Turn on the power again. Turn on the reset switch.
Is the communication cable wired correctly? *1
N
Wire the communication cable correctly.
Y
Breakdown of the corresponding module (baud rate switch)
Is the "SD" LED turned on (flashing)?
N
Breakdown of the corresponding module
Y
Is the station number switch set correctly? (Is it overlapping another station?)
N
Set the station number correctly.
Y
Breakdown of the corresponding module (station number switch)
Turn on the power again. Turn on the reset switch.
Is the station number switch set correctly? (Is it overlapping another station?)
N
Set the station number correctly.
Y
Breakdown of the corresponding module (station number switch)
Turn on the power again. Turn on the reset switch.
End
*1 Check the following: short-circuit, reversed connection, cable breakage, terminal resistor, FG connection, total distance, and the distance between stations.

APPENDIX

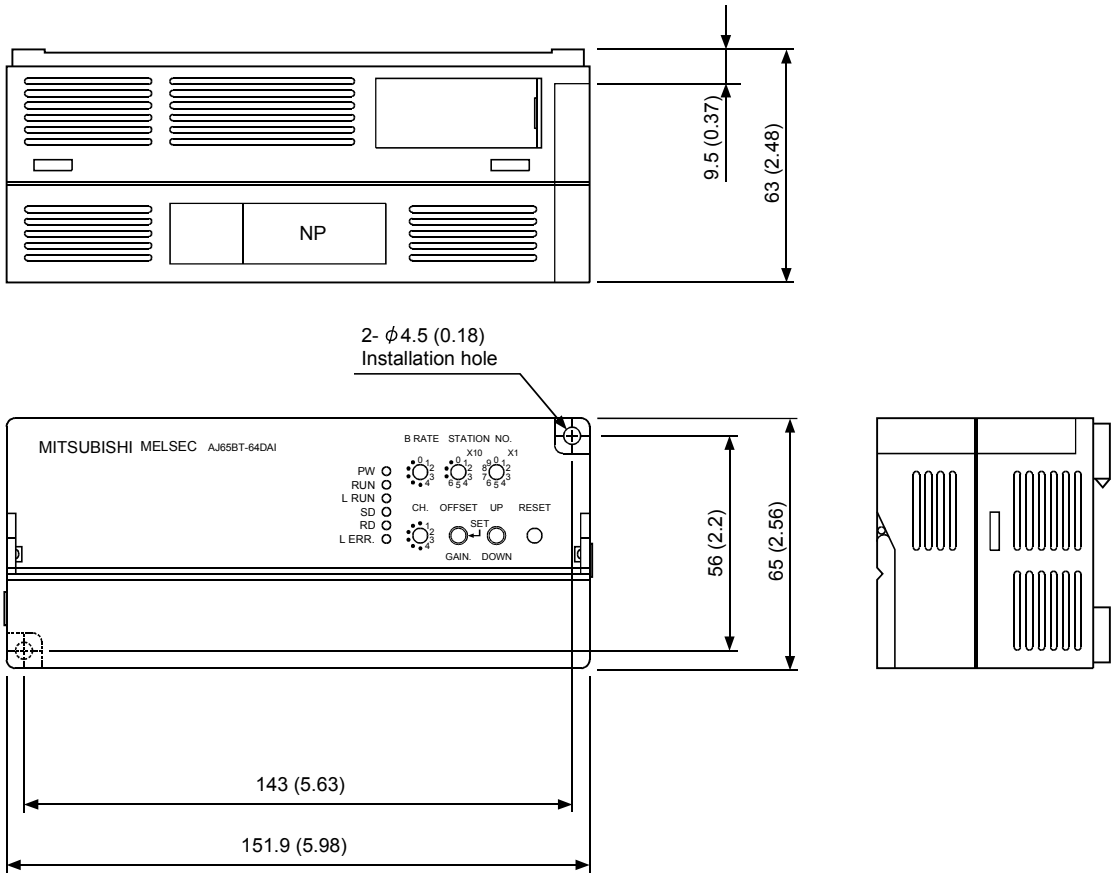
Appendix 1 External Dimensions of the AJ65BT-64DAV



Unit: mm (inch)

App

Appendix 2 External Dimensions of the AJ65BT-64DAI



Unit: mm (inch)

App

MEMO

MEMO

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
(2) The Mitsubishi programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable logic controller applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Digital-Analog Converter Module Type AJ65BT-64DAV/DAI

User's Manual

MODEL	AJ65BT-64DA-U-S-E
MODEL CODE	13J895
SH(NA)-3615-F(0612)MEE	

MITSUBISHI ELECTRIC CORPORATION

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Specifications subject to change without notice.